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3(6)

COMMERCIAL FISHERIES ABSTRACTS

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UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

UNITED STATES DEPARTMENT OF THE INTERIOR
Walter J. Hickel, *Secretary*
Fred J. Russell, *Under Secretary*
Leslie L. Glasgow, *Assistant Secretary for Fish and Wildlife and Parks*

U.S. FISH AND WILDLIFE SERVICE
Charles H. Meacham, *Commissioner*

BUREAU OF COMMERCIAL FISHERIES
Philip M. Roedel, *Director*

FOREWORD

The Department of the Interior's Bureau of Commercial Fisheries publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

Leslie L. Glasgow
Assistant Secretary for Fish and
Wildlife, Parks, and Marine Resources

0.114 Eh AS AN OPERATIONAL PARAMETER IN ESTUARINE STUDIES
(9.11)(9.19)(9.17)

Whitfield, M. (CSIRO Division of Fisheries and Oceanography, Cronulla, NSW 2230, Australia)
Limnology and Oceanography 14, No. 4, 547-558 (July 1969)

Inert metal electrodes (usually platinum), along with reference electrodes to form a complete cell, are widely used to measure the oxidation-reduction potential of chemical systems. By adding the appropriate value for the reference electrode potential corrected for liquid junction effects, one can obtain the redox potential Eh from the potential of the cell E. Problems associated with the technique of measurement, the performance of the inert metal electrode, and the thermodynamic behavior of the environment make quantitative interpretation of Eh measurements in the natural aqueous environment difficult. Nevertheless, the parameter is useful as a semiquantitative indicator of the degree of stagnation of a particular environment.

The author describes a compound probe that reduces the technical problems associated with Eh measurements and makes possible the simultaneous measurement of pH, Eh, and pS^{2-} on a single sample. With the probe, Eh contours can be used to locate and map areas of stagnation even in a complex estuary. The technique can be used for planning detailed studies of the distribution of benthic fauna or of the effect of sediment-water interaction on the chemistry of the estuary. Values of Eh, corrected with pH and pS^{2-} measurements, can be used to determine information about the chemistry of the sediment. With the compound probe described here, says the author, all these properties can be recorded from a single sample after only a few hours' work. [10 figures, 30 references]

 Abstracter: L. Baldwin

On the right is a facsimile of the title page of the 343-page cumulative index now available from OSU Computer Center (Corvallis, Oregon 97331). This volume contains over 24,000 author entries, each followed by the month, year, and page of the issue in which the article appears, the code number assigned the article, and the English language translation of the subject classification. All indexes are hard-bound. Each costs $15.00.

AUTHOR INDEX

TO

COMMERCIAL FISHERIES ABSTRACTS

1954 - 1969

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December, 1969

cc-69-27

0.32 STUDIES ON BOVINE NATURAL ACTOMYOSIN
2. PHYSICO-CHEMICAL PROPERTIES AND TENDERNESS OF MUSCLE

Herring, H. K., R. G. Cassens, T. Fukazawa, and E. J. Briskey (Department of Meat and Animal Science, University of Wisconsin, Madison 53706)
Journal of Food Science 34, No. 6, 571-576 (November-December 1969)

This paper presents information from a study of the physicochemical characteristics of bovine natural actomyosin with regard to (1) the tenderization that occurs in muscle during aging post-mortem and (2) the differences in tenderness due to variation in age of the animal.

Reduced viscosity, ATP (adenosine 5'-triphosphate) sensitivity, and the content of the "F-actin complex" (Maruyama et al., 1962) were higher for bovine natural actomyosin prepared from muscle 12-24 hr. post-mortem than for prerigor muscle (confirming previous reports for rabbit natural actomyosin). An examination of the reduced viscosity differences between actomyosins from tough and tender muscles suggested a higher gel character in actomyosin from tough muscle--probably due to a higher content of α-actinin. The authors found no consistent differences in ATP sensitivity, and myosin and actin content of natural actomyosin of tough and tender muscle.
[9 figures, 30 references]

 Abstracter: F. T. Piskur

0.321 THE BIOLUMINESCENT PROTEIN "AEQUORIN"
(7.51)(0.4)(7.42)

Johnson, F. H. (Princeton University)
Naval Research Reviews 23, No. 2, 16-22 (February 1970)

Jellyfish (Aequorea aequorea) appear in such abundance every summer in the Northwest Pacific that they clog the nets of salmon fishermen and become a nuisance in general. Until 1961 they were viewed as worthless. But then the author revealed that the essential ingredient for light-emission in cell-free, aqueous extracts of this coelenterate is the protein aequorin. This protein can be triggered to emit light only by calcium or strontium, a property that opens the way to a new method for the microdetermination of calcium in biological systems. Such a method has the advantages of sensitivity, specificity, and speed. In principle, the sensitivity extends to as little as 10^{-9} molar calcium in a small volume. Since the sensitivity to strontium is almost as acute, it could, in principle, detect radioactive strontium in a fallout. Aequorin is completely insensitive to all other ions, including magnesium, that interfere with other determination methods. Its fast luminescence ability requires between a fraction of a millisecond and a few milliseconds, at most.

The Navy's problems addressed by this research have to do with the biological effects in the ocean that might affect naval operations and the biophysical principles on which organisms operate to achieve things beyond present technology. Specifically, it seeks to provide an understanding of bioluminescence that would permit creation, or prevention, of light production by natural organisms in (over)

 Abstracter: L. Baldwin

0.32 THE MAILLARD REACTION AND ITS INHIBITION BY SULFITE

McWeeny, D. J., D. O. Biltcliffe, R. C. T. Powell, and A. A. Spark (Food Standards, Science and Safety Division, Ministry of Agriculture, Fisheries and Food, Food Research Institute, Norwich, Nor. 70F, England)
Journal of Food Science 34, No. 6, 641-643 (November-December 1969)

In this paper the authors report chemical and physical studies relating to Song and Chichester's (1966; 1967) conclusions that $\alpha\beta$-unsaturated aldimines are key intermediates in melanoidin production and that sulfite inhibition of the Maillard reaction involves a self-inhibitory conversion of sulfite to a free radical or other equally reactive species.

The present authors found in studies on a sulfited glucose/glycine system that rapid color development (due to the Maillard reaction) did not begin until "free" SO_2 (that is, sulfite/bisulfite ion) had almost disappeared from the system. At that time, "free" SO_2 was less than 5 percent of that added and 28 percent was present in reversible combination with, for example, carbonyl compounds.
[2 figures, 2 tables, 20 references] [Abstracter: F. T. Piskur]

0.321

waters as suited or needed, and that would lead to isolation, characterization, and use of the biochemical products that create light from chemical action without heat. Several potential technological applications are mentioned, with the acknowledgment that, even should they not develop, the work will provide new tools for biochemical and clinical research.

Specific uses to which the method can be put in hospitals and in public health, marine, agricultural, and biological and medical research laboratories are given. Also described is the admittedly inadequate method the author uses to harvest, extract, and purify this photoprotein.
[4 figures, 16 references]

0.33 DISCOLORATION OF FISHERY PRODUCTS. IV. BROWNING REACTIONS IN AMINO ACID-REDUCING SUGAR-LIPIDS AND IN AMINO ACID-REDUCING SUGAR SYSTEMS

Toyomizu, Masamichi, Tunemichi Yamazaki, and Yoshihiro Komori (Kyushu Univ., Fukuoka, Japan)
Chemical Abstracts 72, No. 9, 41917j (March 2, 1970)

0.2 MANUAL OF METHODS FOR FISH STOCK ASSESSMENT.
(9.2)(2.12) PART 1. FISH POPULATION ANALYSIS
(9.6)

Gulland, J. A. (Fish Stock Evaluation Branch, Fishery Resources and Exploitation Division, FAO)
FAO Manuals in Fisheries Science No. 4, Food and Agriculture Organization of the United Nations, Rome, Italy, 154 pp. (1969)

This manual is concerned mainly with the effect of fishing on the stocks and the catches and, thus, with long-term effects. In studying the state of fish stocks and the effect of fishing on them, the fisheries scientist must make his analyses in precise quantitative terms. To this end, he must replace the complexities of the real situation with more or less simplified, abstract mathematical models. Such models can be made to represent both quantities of interest (abundance of the fish population, size of the individual fish) and the relation between these quantities.

In the basic model used almost throughout the manual, the stock considered is assumed to be self contained. In the first sections, each of the factors that cause the stock to change--recruitment, growth of individuals, deaths due to fishing (governed by fishing effort), and deaths due to other causes--is considered separately, and the models are developed to describe each in quantitative terms. In the following sections, these factors are combined to provide a quantitative model for the changes both in total weight of the stock and in catch for various patterns of fishery. Finally discussed are the modifications in the model that are necessary to account for interactions between the various factors.
[31 figures, 37 tables, 179 references] [Abstracter: L. Baldwin]

The illustration below is a facsimile of the top quarter of a randomly chosen page (p. 170) from the Author Index.

LIPK - LIUZ

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LIPSTEIN, BIANKA	NV64	15	6.195	PROTEIN AND AMINO ACIDS (OF MEAL)
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LISK, ROBERT D.	MR62	29	8.59	ORGANIC COMPOSITION, MISC.
LISOVSKAYA, V. I.	OC69	26	8.0	PROXIMATE COMPOSITION OF FISH AND SHELLFISH
LISSONI, A.		23	3.249	CHA[illegible]ED BY FROZEN STORAGE

0.38 PACIFIC COD MUSCLE 5'-NUCLEOTIDASE

Tarr, H. L. A., L. J. Gardner, and P. Ingram (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, British Columbia)
Journal of Food Science 34, No. 6, 637-640 (November-December 1969)

Previous work has demonstrated that inosine monophosphate (IMP) (arising from postmortem enzymic degradation of adenosine 5'-triphosphate-[ATP]) is either deaminated to adenosine 5'-phosphate (AMP) or hydrolyzed to inosine and orthophosphate. Also, the amount of hypoxanthine arising during hydrolysis or phosphorolysis of the inosine has been proposed as a criterion of the postmortem age, quality, and flavor of flesh foods. In the present study, the authors examine the characteristics of the 5'-nucleotidase responsible for postmortem hydrolysis of IMP in fish muscle.

Muscle of Pacific cod (Gadus macrocephalus) was used. The 5'-nucleotidase was purified about 20-fold by chromatography of a dialyzed aqueous extract of the muscle on DEAE-cellulose.

The enzyme was unstable and lost 85 percent of its activity in 1 hr. at 37° C.; 53 percent in 10 min. at 42° C.; and 40 percent in 1 hr. at 30° C. The cod muscle 5'-nucleotidase was stable for 6 days at 0° C., and could be dialyzed for up to 3 days at 0° C. against 1 mM tris buffer at pH 7.5 and quickly frozen and thawed without loss of activity. The enzyme was inactivated rapidly at -30° C. The enzyme could not be further purified by means of chromatography on hydroxylapatite, adsorption using alumina Cγ and starch gel electrophoresis because of its instability.

(over)

0.38 DEOXYRIBONUCLEIC ACID POLYMERASE OF TROUT LIVER NUCLEI

Tarr, H. L. A., and Linda Gardner (Fisheries Research Board of Canada Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 27, No. 1, 117-123 (January 1970)

This paper reports some properties of the deoxyribonucleic acid (DNA) polymerase of the liver nuclei of trout (Salmo gairdneri).

The DNA polymerase of intact trout liver nuclei behaved similarly to that in mammalian tissues in its mandatory requirement for four deoxynucleoside triphosphates, Mg^{2+}, and DNA primer. The DNA polymerase (of trout liver nuclei) was inhibited by deoxyribonuclease and pyrophosphate in comparatively low concentrations and by ribonucleic acid and Actinomycin D in comparatively high concentrations.

Soluble DNA polymerase (extracted from buffered suspensions of the nuclei by centrifugation at 100,000 g.) possessed properties very similar to those exhibited by the enzyme in intact nuclei. The DNA polymerase activity of intact nuclei was increased by freezing and thawing, and the soluble enzyme was unstable at 30° C. and lost most of its activity in 1 day at 0° C. The specific activity of the DNA polymerase was 10-29 picomoles of deoxynucleoside triphosphate incorporated into DNA by 1 mg. of protein per hour at 25° C.
[3 figures, 2 tables, 15 references]

0.38 (0.5) LIPASE FROM PSEUDOMONAS FRAGI
I. PURIFICATION OF THE ENZYME
II. PROPERTIES OF THE ENZYME

Lu, J. Y., and B. J. Liska (Department of Animal Sciences, Purdue University, Lafayette, Indiana 47907)
Applied Microbiology 18, No. 1, 104-107 (July 1969) [Part I]; 108-113 [Part II]

Pseudomonas fragi is an active, lipolytic, psychrophilic bacterium that often gains entry to foods during processing and storage and can produce a serious off-flavor in the food.

Part I describes procedures for isolating the lipase of P. fragi so that the selected characteristics of the enzyme could be studied. The organism was grown in a buffered (pH 7.0) tryptone medium for 4 to 5 days at 20° C. The culture broth was centrifuged and the supernatant fluid was used as the source of the crude enzyme. The lipase was isolated by fractionation with ammonium sulfate at a concentration of 60 percent of saturation followed by precipitation by acetone at a concentration of 30-60 percent. The enzyme was further purified by use of Sephadex G-200 gel-filtration and diethylaminoethyl cellulose chromatography. The purified enzyme was 100 times more active than the starting culture filtrate; the yield was about 1.8 percent of the original activity.
[4 figures, 1 table, 13 references]

(over)

0.5 (9.15) CHARACTERIZATION AND RELATEDNESS OF MARINE VIBRIOS PATHOGENIC TO FISH:
[1] PHYSIOLOGY, SEROLOGY, AND EPIDEMIOLOGY
[2] DEOXYRIBONUCLEIC ACID HOMOLOGY AND BASE COMPOSITION

Pacha, R. E. (Department of Microbiology, Oregon State University, Corvallis 97331), and E. D. Kiehn (Department of Microbiology, University of Washington, Seattle, 98105)
Journal of Bacteriology 100, No. 3, 1242-1247-[1]; 1248-1255-[2] (December 1969)

The purpose of the present study was to examine the characteristics of various marine vibrios pathogenic to fish and to compare these organisms with Vibrio anguillarum, a known fish pathogen.

The first paper describes the cultural characteristics and serological relation of the pathogenic marine vibrios isolated from fish in the Pacific Northwest. Thirteen strains of Vibrio and vibriolike organisms were isolated. The Pacific Northwest strains of Vibrio were closely related to V. anguillarum. Three serotypes were distinguished by serological analyses of thermostable antigens. Serotype 1 consisted of organisms isolated from salmonids; serotype 2, of strains of V. anguillarum from European waters; and serotype 3, of organisms isolated from Pacific herring. [6 tables, 17 references]

The second paper reports on studies of base composition and nucleotide sequence relations of deoxyribonucleic acid (DNA) isolated from several pathogenic (to fish) marine vibrios. The experiments demonstrated the usefulness of DNA

(over)

0.38 [PROTEINASES OF THE INTERNAL ORGANS OF ATLANTIC FISH]
(1.11)(1.22)

Shenderyuk, V. I., and O. N. Shumarova (Kaliningradskii Tekhnologisheskii Inst. Rybnoi Promyshlennosti i Khozyaistva, U.S.S.R.)
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya 1969 2, 25-26(1969)
Food Science and Technology Abstracts 1, No. 12, 1608, Item 12R316 (December 1969)

The authors investigated (1) the qualitative composition of proteinases of the internal organs of various species of Atlantic fish and compared their activity and (2) the proteolysis of the organs at various pH's in buffer solutions. Trypsin and pepsin were identified in the organs. The optimum pH for proteolysis differed with the fish being investigated. Proteolysis was fastest in mackerel and slowest in herring, due to the varying enzymatic activity of the two fish at natural pH. [5 references] [Extracter: L. Baldwin]

0.38

EDTA (ethylenediaminetetraacetate), pyrophosphate, KF, and $ZnCl_2$ (1-10 mM) strongly inhibited the enzyme; GSH (glutathione), 2-mercaptoethanol, carbonate, and $CaCl_2$ (10-100 mM) inhibited it less markedly. Mn^{++} strongly activated the enzyme and Mg^{++} weakly activated the enzyme. The optimum pH was 7.6. The Km (Michaelis constant) was 5×10^{-4}M with UMP (uridine monophosphate) and 8^{-4}M with IMP. The enzyme hydrolyzed, in order of effectiveness, UMP, IMP, CMP (cytidine monophosphate), d-AMP, GMP (guanosine 5'-monophosphate), d-IMP, d-GMP, d-UMP, and AMP, but not p-nitro phenylphosphate, sugar phosphates, or a number of other compounds including 2', 3'-nucleotides.
[3 figures, 2 tables, 30 references]

0.38 Part II reports on the properties of the purified lipase from P. fragi. The optimum pH range for the lipase was from 7.5 to 8.9. A high reaction rate occured at 54° C. Heating a solution of the enzyme for 30 min. at 63° C. reduced its activity by 27.6 percent; total inactivation of the enzyme was achieved by heating the enzyme solution for 1 hr. at 66° C. or for 10 min. at 71° C. The enzyme was inhibited strongly by Fe^{+++} and Fe^{++} ions, and moderately strongly by Co^{++}, Cu^{++}, and Zn^{++}. Ca^{++} and NaF showed no tendency to inhibit enzyme activity. The lipase was markedly inhibited by p-chloromercurobenzene and moderately by N-ethylmaleimide and iodoacetate. The enzyme hydrolyzed natural fats, synthetic triglycerides, and alcohol ethers. The rate of hydrolysis of some triglycerides was in the following decreasing order: trilaurin, tricaprin, tricaprylin, tripalmitin, tributyrin, tricaproin, and tristearin. The enzyme hydrolyzed methyl butyrate but at a rate 1/5 that for triolein and 1/30 that for coconut oil. The lipase lost its activity rapidly when held at 20° C. and at extremes of pH. The activity of the enzyme was not preserved by glutathione, cysteine, or mercaptoethanol. [3 figures, 7 tables, 20 references]

0.6 GROUND MEAT ADDITIVES

U.S. Patent 3,469,995
Jacoby, D., R. J. Berhold; Adolph's Food Products Mfg. Co. (pat.)
Food Technology 24, No. 2, 65 (February 1970)

Amylopectin, chelating agents, and protease are added to ground meat products to improve the texture and moisture-retaining ability and to reduce shrinkage.
[Abstracter: F. T. Piskur]

0.38 ZINC ENZYMES IN CRASSOSTREA VIRGINICA

Wolfe, Douglas A. (Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina 28516)
Journal of the Fisheries Research Board of Canada 27, No. 1, 59-69 (January 1970)

Zinc occurs in biological systems as an integral component of certain enzymes and as a loosely bound component of several other enzymes. However, little is known about the extent and nature of zinc-protein interaction in the oyster. The present paper reports on in vitro studies on zinc-protein associations in homogenates and extracts of oyster tissues, measurements of supposed zinc enzymes in oyster extracts, and experiments on the inhibition of alkaline phosphatase by metal-binding agents.

The authors found that nearly all the zinc in oysters is bound either to soluble high-molecular weight proteins or to structural cellular components such as cell membranes. The alkaline phosphatase in the oyster is a zinc metalloenzyme. The alkaline phosphatase is not affected when the soluble tissue extracts of the oyster are dialyzed at pH 7-9 (removing up to 96 percent of the total zinc). Most of the zinc accumulated by oysters must be superfluous to the animal's requirements--if alkaline phosphatase is considered representative of the metabolic functions of zinc in oysters.
[5 figures, 2 tables, 20 references] [Abstracter: F. T. Piskur]

0.5 SEXUAL REPRODUCTION IN CANDIDA LIPOLYTICA
(0.6)

Wickerham, Lyferd J., Cletus P. Kurtzman, and Alberta I. Herman (Northern Regional Research Laboratory, Agricultural Research Service, Peoria, Illinois 61604)
Science 167, No. 3921, 1141 (February 20, 1970)

The yeast, Candida lipolytica, is outstanding for its ability to produce lipase and extracellular protease. It assimilates hydrocarbons and has potential for the conversion of hydrocarbons to foods and animal feeds (for example, the conversion of petroleum into yeast cells for use in human and animal foods).

The authors found that the yeast existed in nature primarily in the heterothallic haploid state. Because heterothallism permits laboratory control of hybridization, this characteristic of C. lipolytica enhances the possibility of improving strains of this organism for industrial use. Examples of such improvements are the production of soy sauce and miso through diploid hybridization of selected strains of the yeast Saccharomyces rouxii Boutroux.
[7 references] [Abstracter: F. T. Piskur]

0.5 duplex formation and base composition studies in the classification and determination of relatedness of bacteria. Patterns of relatedness inferred from DNA criteria were found to correlate closely with those inferred from morphological, physiological, and serological analysis of the same organism. Furthermore, the results emphasized the strong compatibility of approaches based on genotypic and phenotypic characteristics . [1 figure, 6 tables, 20 references]

0.5 BACTERIOPHAGE INDUCED TRANSFER RNA IN ESCHERICHIA COLI

Daniel, V., S. Sarid, U. Z. Littauer (Weizmann Institute of Science, Rehovot, Israel)
Science 167, No. 3926, 1682-1688 (March 27, 1970)

After a viral nucleic acid enters a susceptible host cell, certain events occur that are governed by the specific viral system. In viruses containing DNA (deoxyribonucleic acid), the nucleic acid acts as a pattern both for the replication of nucleic acid and for the transcription of viral-specific mRNA (messenger ribonucleic acid), which is then translated into viral proteins. The various components of the host translational system are generally thought to remain unaltered and to be used for synthesizing viral proteins--the viral mRNA becomes attached to the preexisting host cell ribosomes, and the host cell tRNA (transfer ribonucleic acid) and aminoacyl-tRNA synthetases then synthesize viral polypeptides. Recent experiments have shown that this rather simplified picture of the events that take place during synthesis of viral proteins may be more complicated, that the translation mechanism may be more intricate. Evidence for changes induced by mammalian and bacterial viruses in the translation mechanism of host cells is summarized, and the studies leading to the conclusion that bacteriophage can induce de novo synthesis of tRNA molecules specific for the viral genome are described. [4 figures, 5 tables, 55 references]

1.30 (1.0159) (2.1476) ON THE DIURNAL CHANGE OF SALMON CATCH BY THE GILL-NET IN THE OKHOTSK SEA

Mishima, Seikichi, and Kenji Shimazaki (Research Institute of North Pacific Fisheries, Hokkaido University)
Bulletin of the Faculty of Fisheries Hokkaido University 20, No. 1, 5-21 (May 1969)

The authors, in a previous paper (1966) on the nocturnal movement of salmon, reported that the surface distribution of pink and chum salmon in concentration is dominant for about 1.5 hours after sunset and before sunrise. Thereafter they made studies of the diurnal movement of salmon by a repeated fishing method in the Okhotsk Sea in July 1967. The diurnal movement of salmon was taken as an index of the fluctuation of salmon caught by 20 tans of gill-net 1,000 m. long and 6 m. below the surface. In those experiments, sockeye, chum, pink, coho, and chinook salmon were caught, but the number of chinook salmon was too small to be dealt with, and therefore the data on this fish were not discussed in this paper.

Sockeye salmon catch predominated on the surface during the day, but at night it became minimum.

Chum salmon were caught every fishing time during the day. But no characteristic movement either in daytime or at night, could be noticed. Large size fish appear in the morning after sunrise, and smaller fish appear at night.

Pink salmon catch predominated both after sunset and before sunrise, but at midnight the catch fell considerably. Pink salmon as well as chum salmon were caught every fishing time during the day.

(over)

1.0119 PUERTO RICO'S COMMERCIAL MARINE FISHERIES. A STATISTICAL PICTURE

Suarez-Caabro, José A. (Fishery Statistics Program, Department of Agriculture, Commonwealth of Puerto Rico)
Commercial Fisheries Review 32, No. 3, 31-36 (March 1970) [Reprint (Sep.) No. 866]

Puerto Rico's fishing industry presents a great contrast: it has a modern, productive, and highly capitalized tuna fleet--and an inshore fishery that has not changed substantially in several generations.

We began to evaluate the inshore marine fisheries, using statistical information, in June 1967. It was part of the Fisheries Research and Development Program cosponsored by the U.S. Department of the Interior and the Department of Agriculture, Commonwealth of Puerto Rico. The University of Miami's School of Marine and Atmospheric Sciences was technical adviser from July 1967 through June 1969. The program was authorized under Commercial Fisheries Research and Development Act of 1964 (PL 88-309).

The main objective is to establish a system for obtaining data on landings and sales of fish and shellfish in Puerto Rico's inshore fisheries. The system will assist the local fishing industry--and fill the statistical needs of the Bureau of Commercial Fisheries and other interested agencies. Statistical data include number and types of fishing craft and gear, and number of fishermen.

This article presents the results of our work in 1968-1969. [14 figures]

1.53 PACIFIC HAKE

U.S. Fish and Wildlife Service, Circular 332, iii + 152 pp. (February 1970)

In the Foreword, Assistant Secretary Glasgow says:

> In recent years, the Pacific hake, Merluccius productus, has been studied extensively by the Department of the Interior's Bureau of Commercial Fisheries. The resulting information on harvesting methods, economics, biological considerations, and aspects of utilization will assist both the fishing industry and management agencies in wise and profitable use of this resource.
>
> This Circular provides a ready summary of present knowledge of the Pacific hake. Included are papers describing the worldwide hake resource and operations of the Soviet hake fleet off our Pacific Coast.

The 12 articles constituting the circular are listed below. Unless otherwise indicated, all authors are with the Bureau of Commercial Fisheries, Seattle, Washington 98102.

"Importance of the Worldwide Hake, Merluccius, Resource," by Richard B. Grinols and Michael F. Tillman (College of Fisheries, University of Washington, Seattle 98105). pp. 1-21. [12 figures, 2 tables, 95 references]

"Distribution and Biology of Pacific Hake: A Synopsis," by Martin O. Nelson and Herbert A. Larkins. pp. 23-33. [2 figures, 1 table, 37 references]

(over)

1.121 (9.12)
PROPOSED MIGRATIONS OF ALBACORE, THUNNUS ALALUNGA, IN THE ATLANTIC OCEAN

Beardsley, Grant L., Jr. (Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory, Miami, Florida 33149)
Transactions of the American Fisheries Society 98, No. 4, 589-598 (October 1969)

Analysis of Japanese longline catch-and-effort data from 1957 through 1965 reveals that albacore concentrate on the western side of the North Atlantic in summer and between from 30° to 40° N. and from 25° to 45° W. in winter. In southern summer, they are abundant off the coast of Brazil; and in southwest Africa. Small albacore are present off the tip of South Africa almost the year round. The North Atlantic albacore are believed to be separate from the South Atlantic albacore; the two groups do not intermingle across the equator. Both groups spawn in the western parts of the ocean, probably in spring and summer. [4 figures, 27 references]
[Abstracter: L. Baldwin]

The listing treats each port from the standpoint, as appropriate, of general holidays, authority, accommodations, bunkers, chargés, towage, pilotage, location of nearest airport, and offfields. [Abstracter: F. T. Piskur]

1.01 (9.2)
PORTS OF THE WORLD 1969

Inc., 34 Oak Avenue, Tuckahoe, New York 10707)

don, E.C.3, England, (23rd edition) 860 pp. (Distributed by John de Graff Published by Benn Brothers (Maxtine Publications) Limited, 7-17 Jewry Street, London,

Anonymous

0.5
COMPARISON OF SURVIVOR CURVES OF BACILLUS SUBTILIS SPORES SUBJECTED TO WET AND DRY HEAT

Fox, Kenneth, and Bruce D. Eder (Department of Food Science, Michigan State University, East Lansing, Michigan 48823)
Journal of Food Science 34, No. 6, 518-521 (November-December 1969)

The rate of death of bacteria subjected to heat may be conveniently described by a survivor curve (logarithm of the number of remaining viable organisms plotted against time). Certain available data suggest that differences between wet and dry heat survivor curves may exist. In the present study, the authors determined and compared the survivor curves of Bacillus subtilis spores subjected to wet and dry heat.

The authors found that wet heat resulted in convex survivor curves at low temperatures and a straight line at higher temperatures for spores of B. subtilis. Dry heat resulted in concave curves at all temperatures used. Apparently physiological differences exist between wet and dry heat destruction of bacteria.
[4 figures, 1 table, 15 references]
[Abstracter: F. T. Piskur]

1.53
"Food of Pacific Hake, Merluccius productus, in Washington and Northern Oregon Coastal Waters," by Miles S. Alton and Martin O. Nelson. pp. 35-42. [2 figures, 4 tables, 18 references]

"Pacific Hake Fishery in Washington and Oregon Coastal Waters," by Martin O. Nelson. pp. 43-52. [2 figures, 2 tables, 32 references]

"Operation of the Soviet Trawl Fleet Off the Washington and Oregon Coasts During 1966 and 1967," by Charles R. Hitz. pp. 53-75. [16 figures, 4 tables, 30 references]

"Midwater Trawling Equipment and Fishing Technique for Capturing Hake Off the Coast of Washington and Oregon," by Leonard J. Johnson and William L. High. pp. 77-101. [20 figures, 8 tables, 8 references]

"Economic Aspects of the 1967 Offshore Pacific Hake Fishery," by Walter T. Pereyra and Jack A. Richards (Department of Economics, Kansas State University, Manhattan 66502). pp. 103-119. [10 figures, 8 tables, 7 references, 1 appendix]

"Proximate Chemical Composition of Pacific Hake," by Max Patashnik, Harold J. Barnett, and Richard W. Nelson. pp. 121-125. [6 tables, 4 references]

"Characteristics of Pacific Hake, Merluccius productus, That Affect Its Suitability for Food," by John A. Dassow, Max Patashnik, and Barbara J. Koury. pp. 127-136. [3 figures, 1 table, 17 references]

"Production of Meal and Oil From Hake," by Richard W. Nelson and John A. Dyer. pp. 137-142. [5 figures, 2 tables]

"Preliminary Studies of the Nutritive Value of Hake Meal for Poultry," by Lawrence R. Berg (Washington State University, Western Washington Research and Extension Center, Puyallup 98371). pp. 143-148. [6 tables, 1 reference]

"Feeding Pacific Hake to Mink," by F. M. Stout, J. Adair, and J. E. Oldfield (all with the Department of Animal Science, Oregon State University, Corvallis 97331). pp. 149-152. [3 tables, 8 references]

1.30

The movement of coho salmon resembled that of pink salmon considerably. It is presumed that catch, which decreased temporarily at night, would be due to the disturbance in the swimming direction and the slow moving of the fish. The phenomena of internal waves suggest a close relation between long- and short-period currents and the diurnal movement of salmon in the Okhotsk Sea.
[11 figures, 6 tables, 11 references]

[Abstracter: L. Baldwin]

1.3 (9.6)
MONUMENTAL SALMON BOOK 10 YEARS WORK

Kidd, Gerry (reviewer)
Salmon: Our Heritage
Lyons, Cicely
B.C. Packers Ltd. (Publisher)
Mitchell Press Ltd., Vancouver, B.C., Canada. 768 pp. (October 1969) $12.50
Western Fisheries 79, No. 2, 70-72 (November 1969)

The reviewer calls this history of the British Columbia salmon industry "the most important collection of information about the industry to be produced up to this time, the prime reference book for the west coast fishing industry for the next 10 years." The beginning with the earliest known canning and shore histories, the part of the federal government in the development of the coastal Indians, it covers people, strikes, marketing problems, corporate explorations of the Canadian west coast and the importance of salmon in the lives of packs that go back to the early 1870's, and short histories on salmon and personal histories, information is assembled in chapters that cover 10 years each. Beginning with the fishing industry as the highlight, herring, groundfish, and shellfish ones. rises of such other species as

1.85 (2.8)(2.118)(8.8) STUDY ON NORTHERN SHRIMP CONFIRMS BEST METHOD TO PROCESS PRODUCT

Anonymous
Quick Frozen Foods 32, No. 6, 111-112 (January 1970)

Northern shrimp abound near the North Pole, along the Continental Shelf of Eastern North America, and particularly in New England waters. The estimated sustainable yield from the New England area alone is 55,000,000 lb. a year. However, a suitable method of processing to prevent the meat from becoming mushy has been lacking. Following reports by Scandinavian fishermen that cooking the shrimp at sea and then freezing them would improve texture and enhance flavor, technologists from the U.S. Bureau of Commercial Fisheries tested the technique on Northern shrimp taken from New England waters. Since New England shrimp are marketed both frozen and unfrozen, the study involved both forms.

In the first phase of the test, shrimp were cooked at sea shortly after being caught, cooked on shore shortly after being landed, or cooked on shore shortly before being served. Immediately after being caught, they were washed in sea water and stored on deck in 125-lb. boxes at ambient temperature--from 34° to 42° F. Within 3 hr. they were cooked, cooled for 2 or 3 hr. at ambient temperature, and either packed in ice or frozen. Upon being landed, the iced shrimp were stored at 33° F. Three times a week the samples were tested (on a 9-point scale) for appearance, odor, flavor, and texture. The shrimp cooked at sea and stored in ice slowly lost quality as storage time increased; their color faded slightly during

(over)

 Abstracter: L. Baldwin

2.00 FRACTIONATION OF MUSCLE PROTEINS OF FRESH WATER FISH AND CHANGES DURING ICED STORAGE

Baliga, B. R., M. N. Moorjani, and N. L. Lahiry (Central Food Technological Research Institute, Mysore, India)
Journal of Food Science 34, No. 6, 597-599 (November-December 1969)

During an earlier study (1962) on the relation between solubility of proteins of fresh-water fish stored in ice and their texture, the authors noticed certain subtle changes in total solubility and in the fraction precipitated at ionic strength 0.225. The partitioning at ionic strength of 0.225 was based on the work of other researchers who were fractionating the muscle proteins of chicken and mammalian species. Connell (1961), however, showed that myofibrillar proteins of fish do not necessarily behave like chicken and mammalian muscle fractions. In the present studies, therefore, the authors examined the characteristics of precipitation at different serial dilutions of buffer extract of ionic strength 0.55 for four species of fresh-water fish during iced storage. The following fish were used: Barbus dubious, Labeo sp., Cirrhina fulungee, and Ophicephalus sp.

The precipitation of Actomyosin of the fresh-water fish was complete at an ionic strength of 0.175 (at ionic strength of 0.225 for that of chicken and mammalian muscle) and for fibrillar protein fraction at 0.05. In the Ophicephalus sp. the initial solubility of the muscle proteins was 91-93 percent; the solubility fell to 85 percent on the fifth day, but it increased on further storage up to 13 days. The fall in solubility on the fifth day coincided with the highest level of actomyosin and the maximum rigidity (rigor of the round fish.) The solubility

(over)

 Abstracter: F. T. Piskur

2.00 PRINCIPAL ACID-SOLUBLE NUCLEOTIDES IN ADDUCTOR MUSCLE OF THE SCALLOP PLACOPECTEN MAGELLANICUS AND THEIR DEGRADATION DURING POSTMORTEM STORAGE IN ICE

Hiltz, Doris Fraser, and W. J. Dyer (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 1, 83-92 (January 1970)

The purpose of this study was to identify the principal nucleotides in the adductor muscle of the scallop immediately post-mortem, and to follow their subsequent changes during storage of the edible muscle in ice. Also, the authors wanted to assess the possible use of one or more of the degradation products as an index of quality of the scallop meat.

Nucleotide degradation of scallop adductor muscle stored at 0° C. proceeded as follows: adenosine triphosphate (ATP) (the predominant nucleotide post-mortem) → adenosine diphosphate (ADP) → adenosine monophosphate (AMP) → adenosine → inosine → hypoxanthine (Hx). In one test lot of scallops, inosine monophosphate (IMP) was present as an intermediate along with AMP, indicating an alternate pathway similar to that in fish muscle. This alternate pathway in which the AMP is degraded to inosine and Hx via IMP rather than adenosine, may exist under certain (undefined) conditions. ATP dephosphorylation in scallop muscle was much slower than in fish muscle, but, as a result of a fairly rapid turnover of intermediates in the degradative sequence, Hx was formed in appreciable amounts (3-4 μmole/g.) within the storage period in which the scallop meats were edible. Taste scores

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 Abstracter: F. T. Piskur

2.00 ALTERATIONS IN THE ELECTROPHORETIC PROTEIN PATTERNS OF REFRIGERATED FISH

Moore, G. S., H. A. Peters, and R. E. Levin (Department of Public Health, University of Massachusetts, Amherst 01002)
Journal of the Fisheries Research Board of Canada 27, No. 1, 31-38 (January 1970)

The purpose of this study was to determine whether the loss in quality of fishery products during storage can be correlated with the electrophoretic properties of the proteins of the tissue. Expressible fluid was obtained from haddock fillets on the 1st, 4th, and 14th day of refrigerated (2° C.) storage. The protein concentration of the expressible fluid was determined and electrophoresis using cellulose polyacetate strips was performed on each sample.

The protein concentration of the haddock muscle press juice remained constant, between 6 and 8 g./ml., over the 2-week storage period at 2° C. Apparently, proteolysis does not occur significantly until after spoilage occurs (also observed by Stal in 1960). The protein concentration, therefore, cannot serve as an indicator of freshness of the fish.

The electrophoretic pattern of the protein of the expressible fluid for each fillet changed during storage (2° C.) of the fillets. Each fillet had a protein pattern characteristic for itself depending upon a number of variables. The authors conclude that electrophoresis alone offers little promise in determining the shelf life of refrigerated fish. However, they suggest that further studies might show that very specific proteins are involved in tissue degradation and careful measurement of the amounts or activities of such proteins could serve to indicate the relative freshness of chilled fishery products.
[8 figures, 2 tables, 8 references]

 Abstracter: F. T. Piskur

2.00

correlated well with Hx contents of the meats, suggesting that measurement of the Hx content of muscle may be a useful index of the quality of the chilled scallop meats.

Adenine, nucleotides and their degradation products accounted for 90 percent of the total acid-soluble purines and pyrimidines in scallop adductor muscle, with nicotinamide adenine dinucleotide and uridine diphosphate glucose as the principal minor nucleotide constituents. The scallop muscle also contained considerable amounts of homarine (2-3 μmole/g.). Glycolysis did not appear to be related to nucleotide degradation and both processes showed a relatively slow post-mortem catabolic rate in the muscle.
[6 figures, 1 table, 31 references]

2.113 BIOASSAY OF MARINE ANTIFOULANTS; II. SCREENING OF SHIPBOTTOM COATINGS

Freiberger, A. (Naval Applied Science Laboratory)
Naval Engineers Journal 82, No. 1, 58-64 (February 1970)

Existing methods for the evaluation of antifouling coatings involve sea or harbor-test-rack trials. Such trials can take 2 years or longer to give the information needed about the effectiveness of a coating. Often too, results of such tests are difficult to interpret because of seasonal, geographic, and other uncontrolable variations that attend natural test exposures. The present paper describes a bioassay for antifouling coatings based upon the response of young adult barnacles to toxic media. Results of bioassays of several antifouling coatings are presented. The test organism is the barnacle Balanus eburneus.

The author concluded that meaningful evaluations of the effectiveness of toxic coatings could be made using laboratory reared barnacles. The responses of the barnacles within the laboratory test environment closely parallel the behavior of barnacles on the antifouling coatings in nature. The laboratory bioassay procedure is capable of providing an accurate determination of the effectiveness of an antifouling coating and of discriminating between coatings differing in activity. The results of the laboratory bioassay correlate well with those given by natural exposure tests. [6 figures, 6 tables, 5 references] [Abstracter: F. T. Piskur]

2.5 TRANSPORTATION OF FISH IN INDIA--PROBLEMS AND PROSPECTS (1.01512)

Perigreen, P. A., and T. K. Govindan (Central Institute of Fisheries Technology, Ernakulam, Cochin-11, India)
Fishery Technology 6, No. 2, 74-78 (1969)

To ensure better economic utilization of India's fish landings, to improve the socio-economic status of the fishermen, and to help solve the problem of protein malnutrition in their country, researchers at the Ernakulam branch of CIFT have launched an extensive research and development program covering all aspects of refrigeration, transportation, and containerization of fish. This report is Part I of the findings. [3 tables] [Abstracter: L. Baldwin]

2.3 VERFAHREN UND VORRICHTUNG ZUM BEHANDELN VON SCHALTIEREN, INSBESONDERE MUSCHELN [METHOD AND DEVICE FOR HANDLING SHELLFISH, ESPECIALLY MUSSELS] (1.88)

Mieras, L., and E. M. Mieras (pat.)
West German Patent Application 1,454,068 (1968)
Food Science and Technology Abstracts 2, No. 1, 129, Item 01R38 (January 1970)

The mussel-cleaning and shell-separating technique works as follows: (1) clusters of mussels are separated in a cutter drum; (2) the separated mussels are moved on a conveyor over a number of rollers, which remove their fibrous appendages; (3) during removal of the appendages, the mussels are washed; (4) the conveyor then moves them to vats of boiling water, which opens the shells and partially loosens the meat; (5) a scavenging machine finishes the loosening process by vigorously agitating the mussels; (6) immersion in a salt solution causes the meat to float and the shells to sink; (7) meat and shells are continuously removed from the salt solution by two different conveyor belts.

[Extracter: L. Baldwin]

1.85

the first 8 days, but relatively rapidly thereafter; their flavor remained sweet for about 10 days; they were acceptable for 18 days, their texture remaining firm throughout that time. The shrimp cooked on shore shortly after being landed had a storage life of about 9 days; their texture became mushy after about 5 days, the mushiness increasing with storage time; their color faded after about 4 days' storage. The shrimp cooked on shore just before being served were soft and had no sweetness after 2 days' storage; at the end of 3 days, their color ranged from light pink to gray.

In the second phase of the test, shrimp were individually quick frozen at sea either raw or after being cooked. While on board, the frozen shrimp were stored in insulated containers at 0° F.; once landed, they were stored at -20° F. At monthly intervals, they were thawed, the raw ones were cooked, and samples from each batch were taste-tested. The shrimp frozen raw at sea and cooked just before the test began were rated fair to good throughout the length of the test, 5 months. Shrimp cooked at sea and immediately frozen were pronounced excellent during that period; they received the best rating of all.

The technologists recognize the financial burden equipping shrimp fleets with cooking facilities will impose. However, their over-all conclusion is that the expenditures for such equipment will be more than outweighed by the ready market the resulting superior product will command. [1 photograph]

2.00

of actin in buffer showed the same pattern of solubility as did the total proteins. The amount of actin that was not reconvertible to f-actin increased during storage of the fish. Viscosity of the buffer extracts increased during the period of development of rigor and decreased on further storage of the fish.
[2 figures, 1 table, 15 references]

2.111 (2.12) WHY WIRE ROPE BREAKS AND HOW TO PREVENT IT

Chase, Lawrence (National Oceanographic Instrumentation Center)
Ocean Industry 4, No. 5, 98-102 (May 1969)

To determine the cause rather than the effect of wire rope failures, the U.S. Naval Oceanographic Office has sponsored a survey of both users and manufacturers of wire rope. Those queried were given 10 choices of why cables fail. The results are as follows: unsuitable construction (twisting, caused by a center core that directly contributes to rotation, and unraveling), 28 percent; fatigue, 20 percent; corrosion, 14 percent; shock, 12 percent; erosion, scuffing, and local wear, 8 percent; insufficient strength, 4 percent; improper handling, 4 percent; improper lubrication, 4 percent; variable rope quality, 2 percent; other causes (electrical problems, vulnerable points such as vulcanized bonds and terminators and conductors that are subject to high loads from snapping motions), 4 percent.

The category under "operating techniques" was divided into seven sections. The results show that inadequate technical information about the equipment, untrained personnel, and little or no guidance in unusual situations often lead crew members to "play it by ear," which, the author points out, is no way to run a ship. Time spent in devising and promulgating standard operating procedures and in thoroughly training personnel is a worthwhile investment. The dividends are continued use of expensive equipment that might otherwise be lost.

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2.1121 (1.26) CONSTRUCTION AND RIGGING OF THE BCF SMELT TRAWL

Ellis, Ian E. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Seattle, Washington), and Clinton E. Stockley (Washington State Department of Fisheries)
The Fishermen's News 26, No. 4, 2, 6 (March 1970--first issue)

Columbia River smelt are now being taken commercially with otter trawl gear fished from gill net vessels. The smelt net introduced last year by the authors' agencies is a small shrimp-type trawl that has several advantages over the gill net. It can be obtained in a virtually ready-to-fish condition for about $250, only a little more than the materials for a diver gill net cost. It is very easily managed from a stern, reel-equipped, gill net vessel; with a little more effort, it can be managed from other types of gill net vessel. It keeps the fish in excellent condition; in case of over production, the fish can be released unharmed. Caught fish do not have to be shaken from the trawl as they do from gill nets--they can usually be emptied directly into boxes for market.

The article gives detailed instructions, with illustrations, for cutting, constructing, and attaching each section of the smelt trawl; for constructing and attaching the trawl doors; and for rigging the net. The last section gives step-by-step directions for fishing the smelt trawl, from the method of checking it before it is set over the side to the best way of pulling it on board when it is filled with fish. [7 figures]

2.1125 CLOSING THE PURSE SEINE GAP

Anonymous
World Fishing 18, No. 11, 42 (November 1969)

The time between that when the buoy or skiff is picked up and the purse seine is actually pursed and the rings brought aboard is very critical, for there is a considerable gap through which fish--especially tuna--can escape. Many methods have been tried to drive the fish away from this gap, but with limited success. Now a more logical method has been introduced: closing the gap immediately after the buoy or skiff has been picked up and the corkline circle completed. This solution involves a submersible hydraulic winch that purses the net from a depth equal to that at the base of the net. The result is that the ends of the net are closed vertically while the wall of netting remains at full depth.

The system works as follows. The net is paid out with the submersible winch suspended from a davit at the rail. The purse line is paid out from the submersible winch just as it would be from the normal pursing winch, the purse rings being taken from the rod as it goes. At this time, the wire barrel inside the submersible winch is disengaged from the drive by means of a clutch; although it runs free, it is under the control of a brake. By the time the net and purse line are fully overboard, the vessel is back at the buoy or skiff and the other end of the purse line is picked up and shackled to the body of the submersible winch. The driving clutch is then engaged, and the winch is lowered overboard to the full depth of the net, taking in purse line as it descends. Also lowered over the side are two hydraulic hoses, which feed the hydraulic motor that powers the winch.

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2.114 (2.1114) LEBUS SYSTEM OF CONTROLLED MULTI-LAYER WIRE ROPE SPOOLING

Anonymous
Sea Harvest & Ocean Science, pp. 40-41 (February/March 1970)

The Lebus system for controlling the spooling of wire rope on a winch drum consists primarily of a specially patterned groove that forces the rope to layer in a predetermined pattern. Among the advantages claimed for the system are safety (because one layer of the rope cannot cut into an underlying layer), increased rope life (because the uniform pattern makes for minimum wear, and the "soft cross-over" feature decreases the pressure between layers and minimizes the rise and acceleration of, and stress on, upper layers as they go over the lower layers), and space saving (because more rope can be accommodated on a smaller drum). The system can be applied to an existing drum by bolting or welding a machine-grooved split sleeve to the drum, by machining the pattern directly onto the drum core, or by fitting the drum core with individually grooved bar segments.

If the lack of space on a vessel prevents the fairlead from being positioned the proper distance from the drum (found by multiplying the width of the drum, in feet, by 23), a fleet angle compensator can be used with the spooling system. This device, which can be mounted anywhere around the periphery of the drum, reduces the 23:1 ratio to 5:1. It consists of an eccentric shaft mounted on self-aligning ball bushing bearings with a bronze bushed fleeting sheave. Tension on the rope controls the oscillating motion of the shaft, and the grooved pattern on the drum controls the fleeting of the sheave.
[4 figures]

2.1126 ON MEASURING THE DROPPING RATE OF SALMON GILL NETS BY MEANS OF UNDERWATER TELEVISION TECHNIQUES

Ishida, Masami, Noritatsu Sano, Seikichi Mishima, and Shoji Saito (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 12, 1157-1166 (December 1969) (In Japanese; figures, tables, and summary in English)

The rate at which salmon dropped from a gill net was measured four times during training cruises in a Hokkaido University fishing vessel. The 1,250-m. net consisted of two sections, one 750 m. long with 115-mm. meashes and the other 500 m. long with 121-mm. meshes. During the experiments, the fish caught in every 50-m. section of the net were observed three or four times by an underwater television camera; the time of observation and the number caught were recorded with a videotape recorder. The recording apparatus was mounted on a specially constructed observation boat that held a course parallel to and about 5 m. from the corkline. Using a formula in which the total fish caught, as shown by individual and sequential scannings, were cumulatively and differentially related, the authors were able to calculate how many of, and under what conditions, the fish dropped from different sections of the net. They found that during the four experiments 4.17, 16.2, 24.1, and 5.85 percent of the fish caught dropped out. The 750-m. section of net always lost more salmon than the 500-m. section did. The number of fish netted had no effect on the rate of drop; the effect of sea-state on the rate was not clear. [14 figures, 3 tables, 3 references] [Abstracter: L. Baldwin]

2.115 DAYBOAT TO 3-DAY BOAT

Stewart, Dave
Western Fisheries 79, No. 3, 32, 34-35 (December 1969)

Before the fishing season began last year, a West Coast troller fitted four 6-in. by 9-in. by 48-in. concrete blocks to the keel of his vessel to ease its motion at sea. Now that the season is over, he analyzes the effectiveness of this unusual type of ballast and gives detailed instructions to other vessel owners who may wish to follow his example.

With the ballast hung on the bottom of the keel, the vessel's hold capacity was increased by 1 ton. Thus, the owner now can carry ice and fish for up to 3 days instead of the 1 day he formerly fished. Moreover, he gets by with one-third the ballast he used to need. The concrete blocks didn't cause the boat to leak, as he had been warned they would; on the contrary, they took the brunt of a reef he ran upon during one trip. They cost about $300 in all.

If he had to make the blocks anew, he would cast five and make them 5 in. by 6 in. by 72 in.; thereby he would get a little more overall weight and would cover most of the keel without having to use wooden spacers. He would still mix the concrete 2:2,2,3 with graded silica as the aggregate, for these proportions make a very dense, hard, strong block. He would not use reinforcing rods, which are expensive; rather, he would use old drive shafts, axles, and other automobile scrap exclusively for extra strength and internal weight. (The grease should be burned from this scrap and then the pieces left out to rust a bit so they will bond with the concrete well.) He would use 100 lb. of scrap to the block rather than 50. [2 photographs] [Abstracter: L. Baldwin]

2.111

Related equipment was blamed by 26 percent of the respondents for rope failures. Three categories of equipment accounted for 98 percent of these particular answers: sheaves and blocks (wrong throat size, too small diameter, improper material, for example), winches (speed, capacity, and control), and fittings (for example, improper size, wrong material and type of fitting, and improperly attached terminators).

The survey team recommended that the following steps be taken to solve one of the main problems plaguing operators of ocean-going vessels:

1. Develop a laboratory method for testing rope, cable, and fittings under simulated deep-ocean conditions.
2. Introduce a universal, uniform system for reporting troubles and failures and establish a data-storage and -retrieval system for the routine handling of the information reported.
3. Periodically distribute bulletins covering operational problems, hazards, and solutions to mariners and manufacturers.
4. Prepare an operating manual covering the do's and don'ts of cable handling, equipment maintenance, and winch operation.
5. Develop a wire rope system that will automatically minimize rope slack under adverse sea conditions.
6. Develop a means of indicating the proximity of a rope-held package to the surface and include an audio-visual indicator that will signal the critical recovery stage.
7. Develop a system for monitoring the underwater action of ropes, cables, and related packages. [6 figures]

2.1125

Pursing continues at net depth till the purse rings are fully closed (indicated by a rise in gauge pressure as the motor becomes overloaded). An air bubble curtain created by an air bottle mounted on the winch discourages fish from passing through any gap that may remain. Finally the winch and purse rings are hauled up, and the purse rings are released so the net can be fed into the power block.

Presently the device has operational and wire-capacity limitations: its maximum depth is 50 fathoms and its wire capacity is 800 m., plus a short length of heavier wire to take the lifting strain when the rings are brought aboard. Either a larger or a double unit is planned to extend the range of the device. As a result of this extension, however, problems related to the disproportionate amount of power that will be required with longer nets and to the effect of increased water pressure must be solved. Notwithstanding, the system has one major advantage for small, multipurpose vessels: they will no longer need a fixed, deck-mounted winch for pursing; the equipment they will need can be put aboard on short notice. [4 figures]

2.118 (1.84) CALICO SCALLOP FISHERY OF SOUTHEASTERN U.S. A PHOTO REVIEW OF LATEST DEVELOPMENTS

Cummins, Robert, Jr., and Joaquim B. Rivers (Bureau of Commercial Fisheries South Atlantic Fisheries Explorations, Brunswick, Georgia 31520)
Commercial Fisheries Review 32, No. 3, 38-43 (March 1970) [Reprint (Sep.) No. 867]

Numerous sporadic attempts to develop automated processing equipment for calico scallops have culminated in the construction of four factory-type scallop vessels. These are equipped with processing machinery that automatically sorts the catch and shucks and eviscerates live scallops at sea. The vessels began fishing in early 1969. The equipment had been used successfully only for shore-based processing in North Carolina, so initial operations consisted primarily of modification and refinement of the system for use aboard ship at sea.

The vessels have operated on the Cape Kennedy grounds out of the Florida east coast ports of Ft. Pierce, Port Canaveral, and St. Augustine. The largest of the four vessels, 'Kon Tiki No. 1', recently was diverted to fishing in Central America because of domestic labor problems. The other vessels, 'Ruth M', 'Sheela L.', and 'Venture', have been operating with variable successes.

By September 1969, production rates had gradually increased to a maximum of about 4,000 pounds of processed scallop meats per 24 hours of fishing. Increased production at that time was limited by the processing equipment rather than the catch rate. During the period, wholesale prices for scallop meats averaged $1.50 per pound. The vessels are "ice" boats that land the processed scallop meats in

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 Reprinted in part

3.12 (3.5) THE USE OF SORBIC ACID IN SALTED FISH

Doesburg, J. J., E. C. Lamprecht, M. C. Elliott, and D. A. Reid (Fishing Industry Research Institute, University of Cape Town, Rondebosch, South Africa)
Journal of Food Science 4, No. 4, 339-352 (December 1969)

Halophilic molds and bacteria can grow on salted fish and produce off-colors, -flavors, and -odors. Previous workers (Boyd and Tarr, 1954; 1955) showed that sorbic acid (trans-2, trans-4 hexadienic acid) could be used to control "dun" (discoloration by molds) in salt fish, but it was not effective against red halophilic bacteria. Also, they found that sorbic acid was stable in the salted fish muscle. The purpose of the present study was to determine the effectiveness of sorbic acid treatment of salt snoek (Thyristes atun Euph.) on the growth of red halophilic bacteria and halophilic molds.

The authors showed that sorbic acid treatment of salt snoek is effective in combatting the growth of the brown mold Hemispora stellata Vuill and red halophilic bacteria (various species). Dipping the salted fish in sodium chloride-sorbic acid solutions was more effective than the use of salt-and-sorbic acid in the salting process. When the snoek were treated with the salt-sorbic acid mixture, the sorbic acid deteriorated probably owing to a catalytic reaction induced by the constituents extracted from the fish. On the other hand, when the salted fish were treated (dipped) with the salt-sorbic acid solution, the sorbic acid in the fish was stable. [2 figures, 6 tables, 24 references]

 Abstracter: F. T. Piskur

2.15 (1.61) RECOMMENDATIONS FOR HANDLING AND ICING FRESH PACIFIC HALIBUT ABOARD VESSELS

Tretsven, Wayne, and Harold Barnett (Bureau of Commercial Fisheries, Technological Laboratory, 2725 Montlake Boulevard East, Seattle, Washington 98102)
Fishery Industrial Research 6, No. 1, 5-13 (March 1970)

The icing of halibut aboard the fishing vessel sometimes is inadequate to minimize the loss of quality during the trip. Observations made of icing and other handling practices aboard halibut vessels serve as the basis for the recommendations suggested here for improving the method of handling. Adhering to these recommendations will help the fisherman land halibut of more uniform quality.

Recommendations for Handling and Icing Fresh Halibut

1. Stun and bleed the halibut as they come aboard the vessel.
2. Immediately after bleeding them, dress and clean them inside and outside.
3. Keep the temperature of the halibut from increasing.
4. Immediately after cleaning each halibut, slide it down a chute into the hold; do not bruise it by dropping it.
5. Prechill the halibut.
6. Ice the pokes of all halibut--small halibut as well as large ones.
7. Lay iced halibut with the dark side down and the white side up.
8. Because the pokes of small halibut are often iced inadequately, use additional ice around the small halibut. (Note: To risk discoloration

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3.15 (2.05)(0.5) RADIATION TREATMENT OF FOODS II. PUBLIC HEALTH SIGNIFICANCE OF IRRADIATION-RECYCLED SALMONELLA

Epps, N. A., and Edmund S. Idziak (Department of Microbiology, Macdonald College, McGill University, Montreal, Quebec, Canada)
Applied Microbiology 19, No. 2, 338-344 (February 1970)

Previous workers have reported difficulties in identification of Salmonella repeatedly irradiated and subcultured. In addition, questions have arisen concerning the public health problem of radiation-resistant strains of pathogenic organisms in foods. The purpose of this research was to study the biochemical characteristics and the virulence of Salmonella repeatedly irradiated and subcultured.

Salmonellae resistant to irradiation were developed by repeated irradiation and subculturing in a nutrient broth-yeast extract medium. The following Salmonellae were studied: S. anatum, S. blockley, S. enteritidis, S. give, S. infantis, S. manhattan, S. montevideo, S. pullorum, S. senftenberg, S. typhimurium, and S. worthington.

The parent and resistant cultures showed few variations in biochemical characteristics but some variation was evident in morphology and in cell division patterns. The irradiation-resistant cultures were considerably less pathogenic for day-old chicks than were the parent cultures, but the phenol-water extracts of the resistant cultures were as toxic as those of the parent material for 10-day chick embryos. Five serial passages of a resistant S. typhimurium culture through chicks did not reverse its reduced pathogenicity or aberrant morphology.

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 Abstracter: F. T. Piskur

2.15

of the skin resulting from the use of the ice around the halibut, which permits the growth of aerobic bacteria, is better than to risk spoilage of the flesh.)

9. Use ice of high density and low temperature.
10. Use mechanical refrigeration to lower the temperature of the hold before obtaining ice; maintain the iced halibut close to 29° F., but do not allow them to freeze.
11. Use thermometers placed throughout the hold to measure the temperature.
12. Use more ice in warm weather than in cool weather.
13. Reduce the amount of heat entering the hold by using effective insulation, by providing curtains as heat barriers about the chute leading from the hatch opening to the ice, and by flooding the deck with sea water.
14. Provide drainage facilities throughout the pens and the holds to prevent blood, slime, or melt water from accumulating and from thereby contaminating the halibut.

[5 figures, 1 table]

2.118

10-pound containers packed in ice; about 12,000 pounds are their maximum holding capacity. When landed, the meats are frozen in liquid nitrogen or sold as "fresh.'

Although equipment modifications continue to be made, the accompanying photographs show the equipment now used for processing calico scallops. The processing time from "on deck" to "ready for packing" is less than 10 minutes.

Five sequential processing steps are shown: (1) sorting the catch; (2) shucking; (3) cleaning; (4) eviscerating; and (5) chilling/packing.

[16 figures]

2.149 DISTRIBUTION OF BROWN SHRIMP (PENAEUS AZTECUS AZTECUS IVES)
(2.12) AS RELATED TO TURBID WATER PHOTOGRAPHED FROM SPACE

Lindner, Milton J., and James S. Bailey (Bureau of Commercial Fisheries, Biological Laboratory, Galveston, Texas 77550)
Fishery Bulletin 67, No. 2, 289-294 (June 1969)

Visual evidence of probable relief currents in the northwestern Gulf of Mexico is provided for the first time by photographs taken from Gemini spacecraft. After rectification of photographs of the Continental Shelf off the Texas Coast, a comparison of the position of relief currents to areas of high shrimp production indicates that photography from space can be a valuable tool for fishery research.

[5 figures, 2 tables, 5 references] [Authors' abstract]

3.15

The results indicated that repeated irradiation and subculturing of Salmonella altered the organism into strains of lesser public health significance.

[1 figure, 7 tables, 14 references]

3.15 STUDIES ON TEXTURAL STABILITY OF IRRADIATED BOMBAY DUCK

Gore, M. S., and U. S. Kumta (Biochemistry and Food Technology Division, Bhabha Atomic Research Center, Trombay, Bombay 85, India)
Food Technology 24, No. 3, 80-83 (March 1970)

In India, the tropical fish Bombay duck (Harpodon nehereus) is preserved by sun drying. Because this drying process is slow and depends upon the weather, much fish is lost through spoilage. On the other hand, Bombay duck does not lend itself well to canning or freezing. In the present study, the authors found that radiation treatment was effective in preserving the fish. The following process was developed. Dip fillets of Bombay duck in a 10 percent solution of sodium chloride for 60 minutes (Alternatively, the fillets may be dipped in a 10 percent solution of sodium tripolyphosphate for 15 minutes.) Drain the fillets, then pack them in polyethene bags and seal the bags. Irradiate fillets at 0.5 Mrad. Bombay duck treated in this manner kept for 21 days at 10° C. without appreciable loss of organoleptic qualities. [7 figures, 19 references] [Abstracter: F. T. Piskur]

3.15 PRELIMINARY STUDIES ON THE EFFECT OF IRRADIATION
(1.01512) AS A MEANS OF PRESERVATION OF FISH AND SHELLFISH

Venkataraman, R., M. K. Kandoran, K. K. Solanki, and C. R. Raje (Central Institute of Fisheries Technology, Substation, Veraval, Gujarat, India)
Fishery Technology 6, No. 2, 153-163 (1969)

In India, no fish destined for the market are being preserved by irradiation. To determine whether the method, either alone or combined with other preservation processes, could be adapted to India's fish-keeping problems, the Central Institute conducted a pilot study on commercially important local fish and shellfish.

Absolutely fresh prawns, Bombay duck, and silver pomfret were irradiated at 0.25 Mrad from a Co-60 source and stored in ice. At intervals, the irradiated fish were compared chemically and organoleptically with unirradiated controls. Although a yellowish or brownish discoloration showed earlier in the irradiated fish and their drip loss was significantly greater, they were acceptable longer than were the controls. The presence of head or gut or both increased the intensity of discoloration; treating the fish with brine before irradiation decreased the drip loss. As a rule, the taste of the control samples was preferred only during the early days of storage; retention of taste was directly related to bacterial load. The characteristics of the irradiated samples were compared with those of the control samples, the limit of maximum storage life for the irradiated samples, based on odor, flavor, and texture qualities, being taken as the point of comparison. [7 tables, 4 references] [Abstracter: L. Baldwin]

3.15 (3.25)(3.2496) (1.50) COMMERCIAL FEASIBILITY OF IRRADIATING HADDOCK AND COD FILLETS: INTRODUCTION

Kaylor, John D., and Edward J. Murphy (Bureau of Commercial Fisheries, Technological Laboratory, Emerson Avenue, Gloucester, Massachusetts 01930)
Fishery Industrial Research 6, No. 1, 1-3 (March 1970)

In the studies introduced by this report, three questions were asked: Is a high enough proportion of haddock and cod, as landed in New England, fresh enough to justify their being irradiated? (2) Is the temperature of fish during commercial distribution by common carrier sufficiently low to preserve the quality of the fish? (3) Can haddock and cod fillets be irradiated and shipped on a commercial scale and still exhibit a significantly increased shelf life at iced temperatures?

The first investigation in the series...was to determine the proportion of haddock landed in Boston that are fresh enough for irradiation.

This study showed that 78 percent of the haddock landed was of a level of freshness that will justify treatment by irradiation. Thus, the proportion of haddock and cod suitable for irradiation is more than adequate.

Our second study showed...that the average temperature of fillets in interstate commerce was less than 40° F. Thus, temperature during shipment via common carriers is also not a problem.

[The] final study showed that, under commercial conditions, haddock and cod had an extension of shelf life of 10 or more days longer than the nonirradiated

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3.60 A MATHEMATICAL MODEL OF THE TORRY FISH DRYING KILN

Doe, P. E. (Torry Research Station, Ministry of Technology, Aberdeen, Scotland)
Journal of Food Technology 4, No. 4, 319-338 (December 1969)

The Torry fish-drying kiln consists of a closed-circuit wind tunnel with provision for heating the circulating air, venting the air to the atmosphere, controlling humidity, and adding smoke. Humidity is controlled by venting, admission of steam, and cooling. Recently the trend has been toward automatic operation of the kilns so as to optimize performance and economy. Such developments require a closer understanding of the commercial fish-drying process, such as the effects of variations in air velocity, temperature, humidity, and fish-packing density. Accordingly, the author has proposed a mathematical model of a kiln to complement the work on model and prototype kilns.

The proposed mathematical model of the Torry fish-drying kiln establishes partial differential equations for fish weight, air temperature, and humidity. It is amenable to computer solution and can predict the separate effects of the various factors on the performance of a kiln. Also, typical operating data can be put into the mathematical model and the model progressively modified to fit real kiln behavior. [9 figures, 1 table, 10 references]

 Abstracter: F. T. Piskur

3.4 COMPOSITION OF AN ETHER-SOLUBLE FRACTION OF A LIQUID SMOKE SOLUTION

Fiddler, Walter, Robert C. Doerr, and Aaron E. Wasserman (Eastern Utilization Research and Development Division, Agricultural Research Service, U.S. Department of Agriculture, Philadelphia, Pennsylvania 19118)
Journal of Agricultural and Food Chemistry 18, No. 2, 310-312 (March-April 1970)

A diethyl ether-soluble fraction of a commercial liquid smoke solution was separated by gas-liquid chromatography and the following compounds were identified: 1-hydroxy-2-propanone (acetol); 2-methyl-2-cyclopentenone; 1-hydroxy-2-butanone; acetic acid; furfural; acetol acetate; 2-furyl methyl ketone; 2,5-hexanedione propionic acid; 2,3-dimethyl-2-cyclopentenone; 5-methylfurfural; butyric acid; γ-butyrolactone; ß-angelica lactone; valeric acid; 1,2-cyclopentanedione; γ-crotonolactone; 3-methyl-1,2-cyclopentanedione (cyclotene); 3,4-dimethyl-1,2-cyclopentanedione; guaiacol; tiglic acid; 3-ethyl-1,2-cyclopentanedione; 4-methylguaiacol; phenol; o-cresol; maltol; 4-ethylguaiacol; 2,5-dimethyl-4-hydroxy-3(2H)-furanone; m-cresol; p-cresol; 2,4-xylenol and/or 2,5-xyleno; 4-propylguaiacol; p-ethylphenol; eugenol; 3,4-xylenol; 4-vinylguaiacol; syringol; cis-isoeugenol; levulinic acid; 4-methylsyringol; trans-isoeugenol; 4-ethylsyringol; 4-propylsyringol; 3-methoxycatechol; 5-hydroxymethyl-2-furfural; vanillin; acetovanillone; and "a catechol". [1 figure, 1 table, 27 references]

 Abstracter: F. T. Piskur

4.11 (0.31) VOLATILE CARBONYL COMPOUNDS FROM HEATED BEEF FAT

Yamato, Takeshi (Research Laboratories, T. Hasegawa Co., Ltd., Nihonbashi, Tokyo, Japan), Tadao Kurata, Hiromichi Kato, and Masao Fujimaki (Department of Agricultural Chemistry, Faculty of Agriculture, The University of Tokyo)
Agricultural and Biological Chemistry 34, No. 1, 88-94 (January 1970)

There are three possible ways in which fats contribute to the formation of the characteristic meaty aroma of cooked meat (beef, pork, and lamb): (1) Fats contain or produce compounds that possess the meaty aroma. (2) Fats contain or produce components which take part in the sugar-amino acid reaction that produces the meaty aroma. (3) The interaction of the aromas from fat and the aromas from the sugar-amino acid reaction produces the characteristic meaty aroma. The carbonyl compounds are considered to be the most important constituent of the meaty aroma. Hornstein and Crowe (1963) found that volatile carbonyl compounds were produced by heating animal fats in air at 100° C. The volatile carbonyl compounds were probably produced by the oxidation of the free fatty acids and triglycerides in the fats.

In the present work the authors studied the production of carbonyl compounds from beef fat heated at 150° C. in nitrogen and at 200° C. in air.

The volatile components from beef fat heated in a nitrogen atmosphere consisted of ethanal, propanal, isobutanal, crotonal, benzaldehyde, acetone, methyl ethyl ketone, methyl isobutyl ketone, glyoxal, and pyruvaldehyde. They were

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 Abstracter: F. T. Piskur

3.239
(3.2491)(1.12) STUDIES ON THE RETENTION OF MEAT COLOR OF FROZEN TUNA. VII. EFFECT OF FREEZING AT SUPER-LOW TEMPERATURES

Bito, Masamichi (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 12, 1193-1200 (December 1969) (In Japanese; figures, table, and summary in English)

The changes in the color of tuna meat subjected to various prefreezing routines were followed for up to 70 days of storage at -20° C. (1) Meats prefrozen at temperatures ranging from -10° to -40° C. before being immersed in liquid nitrogen lost less color during storage than did meats prefrozen at from -60° to -100° C. (2) Meats prefrozen slowly in still air at -22° C. and then immersed in liquid nitrogen discolored during storage at about the same rate as did meats prefrozen rapidly on a metal plate in nitrogen vapor at -60° C. before immersion. (3) Meats prefrozen in still air to -20° C. and then immersed for 30 min. in isopentane and liquid nitrogen at temperatures ranging from -40° to -196° C. discolored at about the same rate during storage. (4) Meats prefrozen to -20° C. in still air were immersed for 30 min. in isopentane at temperatures ranging from -80° to -160° C. or in liquid nitrogen at -196° C.; the faster the meats were frozen and the lower their temperature before storage, the less they discolored. (5) Meats were prefrozen to -20° C. and then immersed in liquid nitrogen for 5.5, 6.5, 8.0, 10.0, or 50.0 sec.; those immersed for 10 sec. and for 50 sec. discolored least during storage.

From these results, the author concludes that color retention is best in tuna meats rapidly frozen at temperatures ranging from -40° to -60° C. He points out that prefreezing is an effective means of preventing the meat from cracking following super-rapid freezing. [6 figures, 1 table, 11 references]

[Abstracter: L. Baldwin]

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control samples. This extension is great enough to enable industry to ship fish to any sector of the nation and still have enough residual shelf life to permit marketing in the normal manner.

The details of the three studies will be reported in three future papers.

[1 figure, 5 references]

4.11

isolated as their 2,4-dinitrophenylhydrazones and identified by means of thin-layer chromatography, and infrared, mass, and proton magnetic resonance spectroscopy.

The volatile components from beef fat heated in air included those listed above as well as the following (identified by gas-liquid chromatography): hexanal, haptanal, 2-heptenal, octanal, 2-octenal, nonanal, 2-nonenal, 2-decenal, 2,4-decadienal, and 2-undecenal. The authors found that a so-called oily odor in the beef aroma of the volatiles from beef fat heated in air was stronger than that of volatiles from beef fat heated in nitrogen. The difference in the degree of oily odor was believed to be due to the higher content of long-chain carbonyl compounds in the volatiles from beef fat heated in air.

[6 figures, 1 table, 21 references]

3.2349
(9.6) FREEZE DRYING OF FOODS AND BIOLOGICALS 1968

Noyes, Robert
Food Processing Review No. 1, 313 pp. (n.d.) $35
Noyes Data Corporation, Noyes Building, Park Ridge, New Jersey 07656

The 105 U.S. patents issued between January 1960 and May 1968 covering freeze drying form the basis of this book. The book contains not only many ideas for cutting capital costs for equipment and operating costs but detailed technical information about the process of freeze drying as well.

[Abstracter: L. Baldwin]

3.61 [PROCESS FOR DRYING FOODSTUFFS]

Norwegian Patent 117,337 (1969)
Tangsoud, R., and O. G. Devick (SINTEF)
Food Science and Technology Abstracts 2, No. 1, 24, Item 01E49 (January 1970)

Comminuted frozen foodstuffs are deposited on a carrier, and a gaseous drying agent is passed through them at a velocity high enough to hold them suspended but not high enough to carry them away. The treatment causes the food to thaw and its particles to bond and form a porous mass. Then the velocity and the temperature of the drying agent are gradually increased till the mass is consolidated. The process is particularly applicable to meat, fish, prawns, and similar foods.

[Extracter: T. Bagdwin]

4.14 MINOR CONSTITUENTS OF WHALE OILS. II. POLYUNSATURATED FATTY ACIDS AND ALCOHOLS IN SPERM BLUBBER OIL

Sano, Yoshihiko (Miyoshi Oil and Fat Co., Ltd., Tokyo, Japan)
Chemical Abstracts 72, No. 8, 33512k (February 23, 1970)

3.2495
(3.2493) [INDICATIONS OF QUALITY IN FISH AND FISH PRODUCTS]

Valencia, M. E., and J. C. Sanahua (Dept. Bromatologia y Nutricion Expt., Facultad Farmacia y Bioquimica, Univ. Buenos Aires, Argentina)
Anales de Bromatologia 21, No. 1, 45-58 (1969)
Food Science and Technology Abstracts 2, No. 1, 127, Item 01R28 (January 1970)

Using inosine 5'-monophosphate (IMP), inosine, and hypoxanthine (products from the autolytic breakdown of fish muscle nucleotides) as indicators of storage life, the authors froze Genypterus blacodes, Paralichthys patagonicus, and Southwest Atlantic hake at -40° C. and determined the amount of each degradation product daily in each fish. In G. blacodes, the IMP content dropped from an initial value of about 2 μM/g. to 1 μM/g. in 8 days; the total content of inosine and hypoxanthine rose from an initial 2.75 μM/g. to a maximum of 3.8 μM/g. on the fourth or fifth day, then gradually decreased. In P. patagonicus, IMP content reached a stable level of 1 μM/g. in 9 days; the content of hypoxanthine and inosine rose to 6 μM/g. in 8 days and then began to decrease. In hake, IMP content decreased slowly; as a result, the increase in hypoxanthine and inosine continued for more than 10 days, possibly due to the low level of 5'-nucleotidase in the fish. The decrease in IMP was accompanied by a loss of flavor, a change that was independent of bacterial activity. [13 references] [Extracter: L. Baldwin]

4.22 BRANCHED-CHAIN FATTY ACIDS OF FOUR FRESH-WATER FISH OILS

Ackman, R. G., and S. N. Hooper (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia)
Comparative Biochemistry and Physiology 32, No. 1, 117-125 (January 1, 1970)

In 1967, the senior author and his coworkers examined the methyl esters of fatty acids from sheepshead (Aplodinotus grunniens), tullibee (Coregonus artedii), maria (Lota lota), and alewife (Alosa pseudoharengus), emphasizing the essential polyunsaturated fatty acids. Their findings indicated that the differences between fresh-water and marine oils, so far as individual acids and types of acids are concerned, are more a matter of degree than of kind. In the present work, the authors have examined less well-known fatty acid constituents of these oils; the linear odd-numbered fatty acids, the iso and anteiso monomethylbranched fatty acids, and the multimethylbranched isoprenoid acids derived from phytol. Using open-tubular (capillary columns) gas-liquid chromatography, they analyzed the hydrogenated fatty acid methyl esters from the oils of the four fresh-water fish examined earlier and compared the findings with those previously reported for marine fish.

Most of the originally saturated odd-numbered normal fatty acids, as well as the iso and anteiso acids, found in the fresh-water fish oils were exactly the same acids as those reported for marine oils and lipids; in addition, the relative proportions were quite similar. The iso:anteiso ratio was generally lower, possibly reflecting a high level of anteiso 17:0 relative to iso 17:0. If allowance

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4.83 SEMINAR ON CASHEW NUT SHELL LIQUID
(2.113)(2.2)

Indian Institute of Foreign Trade, New Delhi, and Cashew Export Promotion Council, Ernakulam, Cochin-16, India (February 21 and 22, 1969)

Two of the papers presented at the subject seminar by members of the Central Institute of Fisheries Technology, Craft & Gear Wing, Cochin-5, are reviewed here.

"Investigation on the Utility of Cashewnut Shell Liquid as a Surface Coating Material on Wooden Fishing Boats," by R. Balasubramanyan and A. G. Gopalakrishna Pillai; 4 pp., 4 tables, 5 references.

Cashew nut shell liquid (CNSL) is a byproduct of the cashew industry. It is a dark, reddish-brown, viscous liquid that is used in the crude form by coastal fishermen to protect their craft from marine bacteria, marine fungi, and termites. However, despite its vesicating properties, it is not sufficiently toxic to protect timbers in sea water from wood borers, barnacles, oysters, hydroids, and tube worms. The authors found that supplementing CNSL with such toxic substances as dieldrin or copper salts would keep all shipworms and most Martesia sp. away from timber blocks immersed in sea water for as long as 150 days. Even more effective is the oil-soluble resin obtained by condensing CNSL after decarboxylation with phenol formaldehyde; it is a good protective against weathering and fungal infection, an efficient water- and moisture-proof coating, and an effective caulking compound. This modified resin, when combined with linseed-oil resin and used in an appropriate percentage as the matrix in antifouling marine paint, controls the

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4.64 EFFECT OF ETHOXYQUIN ON THE NUTRITIONAL VALUE OF ANIMAL BYPRODUCTS
(6.132)

Kirkland, W. M., and H. L. Fuller (University of Georgia, Athens)
Feedstuffs 42, No. 11, 17-18, 20 (March 14, 1970)

The nutritional value of fish meal has been improved over the past 15 years by addition of an antioxidant to the meal during or immediately after processing. Some of the research findings during this period are listed below.

Antioxidant treatment reduces heating during the curing process and improves protein digestibility; stabilization of the meal increases its energy level by preventing oxidation of the residual oils (Meade, 1956).

Ethoxyquin offers greater protection against oxidation than any other antioxidant offers (Brown et al., 1957; Lea et al., 1960).

Treatment of herring meal with butylated hydroxytoluene protects the fat against oxidative changes that cause a decrease in solvent extractability and iodine number (March et al., 1962).

The utilization of metabolizable energy for net energy and growth is greater when fish meal has been stabilized (DeGrote, 1968).

The metabolizable energy values of fish meal treated with an antioxidant are from 15 to 20 percent greater than those of untreated fish meal (Matterson and Ousterhout, 1969).

This article reports the results of experiments run to determine the extent of oxidative decomposition in poultry-byproduct meal (PBPM) and meat-and-bone

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6.133 AN IMPROVED METHOD FOR OBTAINING GOOD GRADE FISH OIL
(6.138) FROM OIL SARDINES (SARDINELLA LONGICEPS)

Visweswaraiah, K. (Central Food Technological Research Institute, Mysore, India)
Journal of Food Science & Technology 6, No. 2, 99-102 (June 1969)

India imported fish oil worth Rs96,339 from the United Kingdom and Norway in 1964-65; during the same period, large quantities of locally produced fish oil remained unsold. Because of the great demand for a good grade of fish oil for industrial purposes, the author investigated the influence on sardine oil of the quality of fish from which the oil was extracted, cooking time, dehydration rather than cooking in water as one of the processing steps, and adding formaldehyde to the stickwater.

The foremost influence on the color, smell, and yield of fish oil is the quality of the fish. When fish are prime--that is, when the total volatile base (TVB) in the muscle is 7.5 mg. N percent and trimethylamine (TMA) is 1.4 mg. N percent--the yield is maximum, the color of the oil is golden yellow, and the smell, though fishlike, is fresh. When the TVB content of the muscle becomes as high as 28 mg. N percent and its TMA reaches 6 mg. N percent, the oil yield is reduced by about 16 percent, the fat (on a moisture-free basis) left in the press cake reaches about 20 percent, and the oil is brown and smells like decomposed fish.

From 10 to 15 min. cooking time (5 kg. samples were used in the experiments) gives the maximum yield of straw-colored, fresh-smelling oil. Over-cooking makes

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meal (MBM), treated and untreated with ethoxyquin, and in feeds that contain these meals.

Adding ethoxyquin at the rate of 750 p.p.m. to the meals prevented any appreciable oxidation of their residual lipid fractions during extended periods of storage time. The peroxide value seems to be a more sensitive indicator of oxidation than the iodine number--unstabilized PBPM had a peroxide value of 32 after 2 weeks' storage but it showed a statistically significant drop in iodine number only after 6 or more weeks. The stabilized PBPM never showed the presence of peroxides. Stabilized MBM had 10 percent higher metabolizable energy values after 12 weeks' storage than unstabilized MBM had. Adding the stabilized meals to chick diets at a level of 28 percent increased the growth rate of the chicks by 28 percent. In one experiment in which unstabilized PBPM was added at the 28 percent level, one chick developed nutritional encephalomalacia (each treatment consisted of three replicate pens of 10 chicks each); this diet contained a high level of peroxides. Adding unstabilized PBPM to the diet at low levels (5 percent) had no detrimental effect on the chicks' growth rate or feed conversion efficiency. The dietary fat was unstable when the diets contained no antioxidant, regardless of the level at which the PBPM was added. [8 tables, 11 references]

4.82 DAIRY COW FEEDS

German Patent Application 1,492,912
Quaker Oats Co. (pat.)
Food Technology 24, No. 2, 72 (February 1970)

Unsaturated fatty acids or their derivatives are fed in controlled amounts to dairy cows to increase milk production. [Abstracter: F. T. Fiskur]

4.22

be made for the addition of originally unsaturated fatty acids (especially 17:1 and 21:5ω 2) to the hydrogenated samples, the totals for odd-numbered linear fatty acids were also similar to those of marine lipids.

The results showed no fundamental differences in the deposition or metabolism of the isoprenoid fatty acids--namely, 4,8,12-trimethyltridecanoic, pristanic, and phytanic--in the oils of fresh-water and marine fish. Whether or not the pristanic acid contains more than the two isomers, however, remains to be established. Almost all marine lipids and all but those of the alewife of the four fresh-water oils had phytanic acid isomer ratios of LDD>DDD. The authors could find no reason for the general preponderance of the LDD diastereoisomers in sheepshead, tullibee, and maria, nor could they find any biological or biochemical reason for the predominance of the DDD isomer in the alewife. They suggest, however, that the linear odd-numbered acids, being perhaps unusually low in the alewife, may have some effect mutual to these two types of acid. [1 figure, 3 tables, 37 references]

4.29 ISOLATION AND FRACTIONATION OF POLYUNSATURATED FATTY ACIDS

Privett, Orville S. (Univ. of Minnesota, Austin, Minnesota)
Chemical Abstracts 72, No. 8, 3351δn (February 23, 1970)

6.133

the muscle pasty and the pressing operation difficult. Cooking for more than 20 min. cuts the yield from 57 percent to 36 percent and turns the oil brown.

Dehydrating the fish from a moisture content of 70 percent to between 55 and 60 percent increases the oil yield from 37.5 percent to about 80 percent and, instead of a greenish yellow color, gives a bright yellow oil. Further dehydration drastically reduces the yield of oil and results in a red oil having a charred smell. This method of processing gives from 3.5 to 4.5 percent more oil than the traditional method of cooking gives, takes less fuel, and, because the volume of press liquor is about 50 percent less, results in a press cake that converts to whole fish meal of higher nutritive value. The method does not impair either the color or the smell of the oil.

The moisture and protein in stickwater is a good medium for bacterial activity. Untreated oil becomes dark brown and offensively odorous within 4 or 5 days of extraction from the fish. Adding 40 percent formaldehyde in the ratio of 1 ml. to 1 liter stickwater-oil emulsion maintains the original color and smell of the oil for as long as 22 days. Since the oil is usually heated to between 105° and 110° C. before it is packed in tins for commercial use, no detectable quantity of formaldehyde shows up in the final canned oil.
[5 tables, 9 references]

4.83

rate of dissolution of the toxic element in the paint and prolongs the effectiveness of the paint.

"On the Development of a Ship Bottom Paint Composition Using Modified Cashew Nut Shell Liquid (CNSL)," by K. Ravindran, A. G. Gopalakrishna Pillai, and R. Balasubramanyan; 3 pp., 2 tables, 7 references.

The use of a cathodic system for protecting steel hulls against corrosion affects the anticorrosive paint used on the hull, particularly in the vicinity of the anodes. Using a commercially available CNSL condensation product (marketed under the trade name SILIX), the authors formulated a coating for use on cathodically protected structures. They applied the composition to primed and unprimed steel test panels that had been scribed in the standard manner and kept the panels at a potential of -780 mv. with respect to a saturated calomel electrode in a tank containing a 3.4 percent sodium chloride solution for a week. At the end of the test, the coating showed no blistering or softening (oil- or oleo-resin-based paints become easily saponified under these test conditions). The other qualities prescribed for anticorrosive compositions--for example, resistance to salt spray, aerated sea water, 2 percent sodium carbonate, and lubricating oil, flexibility and adhesion; scratch hardness--were also satisfactory.

6.138 (6.133) CHEMICAL PRESERVATION OF SARDINE FISH TO OBTAIN A GOOD GRADE FISH OIL (PART I)

Visweswaraiah, K. (Central Food Technological Research Institute, Mysore, India)
Journal of Food Science & Technology 6, No. 2, 103-105 (June 1969)

Fish oil processed by the fishermen along the coast of India invariably has a dark color, an unpleasant spoiled odor, and a high free fatty acid content. These characteristics prohibit industrial application of the oil and lower its market value. The 10-12 hr. time gap between catching and processing, the 28°-30° C. local temperatures, and the fact that oil sardines are highly susceptible to deterioration are the basic causes of the poor quality. The author undertook to find some chemical that would preserve the quality of the fish without impairing the color, smell, or yield of the oil extracted from them.

Immersing oil sardines in solutions containing either from 100 to 250 p.p.m. aureomycin hydrochloride, from 1 to 2 percent sodium benzoate, 2.4 percent sodium hypochlorite, 2 percent hexamine, 0.5N ammonia, up to 15 percent (w/v) sodium chloride, 20 percent brine, saturated brine, various concentrations of formaldehyde, or various concentrations of sodium nitrite all had drawbacks as preservative agents. Some made the muscle too soft and some made it too hard; some wouldn't penetrate to the belly cavity and some cost too much to be economical. So the author investigated combinations of these preservatives. Immersing the fish either in 0.4 percent sodium nitrite or in a saturated sodium chloride solution, both containing 0.4 percent (w/w) formaldehyde, kept the fish in good condition for at least 24 hr. at temperatures of from 27° to 30° C. Since the cost

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 Abstracter: L. Baldwin

6.195 THE INFLUENCE OF DIETARY PROTEIN INTAKE DURING LACTATION ON THE REPRODUCTIVE PERFORMANCE OF SOWS

MacPherson, R. M., F. W. H. Elsley, and R. I. Smart (Rowett Research Institute, Bucksburn, Aberdeen, Scotland)
Animal Production 11, Part 4, 443-451 (November 1969)
Morrison, S. H. (reviewer)
Feedstuffs 42, No. 9, 33-34 (February 28, 1970)

For many years now it has been known that the amounts of energy and protein fed gilts and sows during pregnancy should be limited. What they should be fed during lactation and what the effects of different feeding programs are on their later performance, however, are less well known. In this paper, the effects of diets containing three levels of crude protein on milk production, litter performance, and sow performance were examined over a period of three successive lactations.

From the time they were 238 days old till they were mated, 45 closely-related Large White gilts (average weight 225 lb.) were fed about 6 lb./day of a diet containing 15.5 percent crude protein. During pregnancy, they were fed 4.85 lb./day of a diet containing 14 percent crude protein and 4 Mcal. gross energy/kg. dry matter. After parturition, the sows were divided into three groups, and the animals in each group were fed 11.7 lb./day of one of three experimental diets. Each diet contained about 10 percent maize meal and 10 percent wheat middlings. But the diet containing crude protein at the 19.2-percent level contained 60.9 percent barley meal and 15.2 percent whitefish meal; the diet containing crude protein at the 16.3 percent level contained 65.4 percent barley meal and 11.4 percent whitefish meal; and the diet containing crude protein at the 14.1 percent level

(over)

 Abstracter: L. Baldwin

6.199 (4.82) EFFECT OF FEED INGREDIENTS ON THE DEVELOPMENT OF OFF FLAVORS IN TURKEY MEAT

Lineweaver, Hans (Poultry Laboratory, U.S. Department of Agriculture, Albany, Calif.)
fornia)
Feedstuffs 42, No. 9, 30-31 (February 28, 1970)

This article is essentially a review of investigations made over the past half century on the fishiness problem in poultry.

The fat-free muscle, which makes up more than 80 percent of the edible part of a turkey, has a remarkably constant composition in healthy birds, regardless of what they eat. But the other 20 percent of the edible carcass can generate serious off-flavors if the feed contains too much of the wrong kind of fat. The fatty-acid components of a fat can be absorbed and deposited in the bird essentially unchanged; thus the bird's fat tends to resemble the dietary fat at moderate or high dietary fat levels. Klose et al. showed in 1951 that highly unsaturated oils--for example, linseed drying oil--can cause fishiness in turkeys. It is the chemical characteristics, not the source, of the oil, that make for off-flavor; oils that contain fatty acids having more than two double bonds cause the fishiness. (Linseed oil contains large amounts of unsaturated fatty acids having three double bonds; fish oil contains comparatively large amounts having four, five, or six double bonds.) Variations in the extent of oxidation of an oil can also cause differences in degree of fishiness, probably because of the polymerization that accompanies oxidation--polymerized fats are less readily absorbed than the less complex fats.

(over)

 Abstracter: L. Baldwin

6.32 (6.37) NUTRIENT CONTENT OF TURTLE GRASS (THALASSIA TESTUDINUM)

Bauersfeld, Paul, R. R. Kifer (Bureau of Commercial Fisheries, Technological Laboratory, College Park, Maryland), Norman W. Durrant (Bureau of Commercial Fisheries, Department of the Interior, Washington, D.C.), and James E. Sykes
Proceedings of the Sixth International Seaweed Symposium, Santiago de Compostela, Spain, September 1968, pp. 637-645 (1969)

Turtle grass (Thalassia testudinum) grows abundantly in the euphotic zone off the southern coast of the United States. The plant has flat, narrow leaves originating from a rhizome system. Yields of dry matter from the entire plant have been reported as ranging from 2.9 to 30 tons per acre. Although the leaf portion constitutes only 23 percent of the total plant, the potential commercial harvest is substantial.

Data were collected on the chemical composition (proximate composition, mineral spectrum, and carbohydrate and amino acid content) of both the leaves and the rhizomes. An experiment was conducted to determine if changes in chemical content occurred following washing of the plants in fresh water for varying periods of time. 15 minutes washing resulted in (1) a 61-percent increase in available protein, (2) a 50-percent reduction in ash, and (3) and 11-percent reduction in sodium chloride equivalent.

(over)

 Authors' abstract

6.190 HORSE RATION

Canadian Patent 823,609
Gandier, J. C. C.; Ayerst, McKenna & Harrison Ltd. (pat.)
Food Technology 24, No. 2, 72 (February 1970)

Horse rations (without hay) are prepared from materials high in fiber content (supplied by cereal grain fiber or nut hull meal) and with the required calories (supplied by soy meal, fish meal, or other similar type products).

[Abstracter: F. T. Piskur]

6.32

Two feeding trials were conducted to determine the feasibility of using the grass in sheep rations. The first trial indicated that turtle grass could not promote normal growth in sheep when used as the sole food. The second trial indicated that a ration of turtle grass replacing 20 percent of the alfalfa in a sheep diet produced a significant increase in rate of gain when compared with a control diet containing 50 percent alfalfa and 50 percent corn.
[10 tables, 6 references]

6.195

contained 70.0 percent barley meal and 7.5 percent whitefish meal. All included mineral and vitamin supplements. After the pigs were weaned, the sows were twice again fed the same diets, the times of feeding being marked off into the following intervals: (1) from their pigs' weaning to their own mating, (2) during pregnancy, and (3) after parturition.

When the pigs were 14 days old, their diet was supplemented, free choice, with a creep feed that included barley meal (33.5 percent), flaked maize and rolled oat groats (20.0 percent each), dried skim milk (10.0 percent), and whitefish meal (6.5 percent). Litters were standardized at nine pigs; for each pig that died, the sow's feed was reduced by 0.88 lb./day. If a litter was reduced to less than seven, it and the mother were no longer used in the experiment.

The results were analyzed in terms of number and weight of pigs borne by sows completing three lactations; mean litter-weight gain, creep-feed consumption, and sow-weight changes during lactation; yields of whole milk and its constituents; and digestibility of nitrogen, energy feed, and dry matter. Few trends were significant. However, as the concentration of protein decreased, the average gain of the pigs of first-lactation sows increased significantly; the same trend appeared, to an insignificant degree, in the second lactation but not in the third. Sows fed at the 16.3 and the 14.1 percent protein levels lost a significant amount of weight during first lactation, but not during the second or third. Milk yields--as well as protein, fat, lactose, and total-solids content--by sows fed at the 14.1 percent protein level were higher than those by the other sows; during successive lactations, the fat content was lower.

Among the general conclusions drawn by the authors, and supported by the investigations of O'Grady (1967) and Neilsen (1968), is that diets containing 13 percent protein are quite satisfactory for lactating sows. [6 tables]

6.138

of preserving 1 metric ton of oil sardines for 22-25 hr. is Rs58 when a sodium nitrite plus formaldehyde solution is used and Rs30 when a saturated sodium chloride plus formaldehyde solution is used, and since the latter gives somewhat higher yields of oil and makes separation of oil from stickwater quicker and easier, the author recommends the latter. [1 table, 10 references]

6.14 [STORAGE AND TRANSPORTATION OF FISH MEAL IN BULK]

Shif, I. G.
Rybnoe Khozyaistvo 45, No. 7, 61-63 (1969)
Food Science and Technology Abstracts 2, No. 1, 128, Item 01R33 (January 1970)

Using pneumatic systems to transport fish meal within the factory decreases operational losses, possibilities for contamination, and the need for other handling systems. The pneumatic equipment used in U.S.S.R. is described, as are the technical requirements of the product during bulk storage and the problems created by loading fish meal in bulk. [3 references] [Extracter: L. Baldwin]

6.199

Certain studies have shown that the fishmeal content of the diet should not exceed 6 percent if the oil content of the meal is as high as 5 percent; it should not exceed 3 percent if the oil content is as high as 10 percent. In 1954, Marsden recommended that no fish oil at all be fed to turkey broilers and that not over 5 percent fish meal be fed. The amount of fish meal added to the diet, however, should depend on the ether-extractable nonpolymerized oil content of the meal, not the meal itself. The fishiness-inducing potential of the unsaturated oils in a meal is not decreased by treating the meal with an antioxidant, for it is the function of antioxidants to retard oxidation and polymerization.

The author gives the results of several experiments showing that the flavor of turkeys fed diets containing highly unsaturated fat can be made acceptable to the consumer by removing such fat from the diet for from 4 to 8 weeks before the turkeys are marketed. The length of time required for the return to normal depends on the degree of fishiness. [1 figure, 1 table, 17 references]

6.33 ARTIFICIAL MILK

Israeli Patent 24,161 (1969)
Schnell, S.; and R. Yishai (pat.)
Food Science and Technology Abstracts 2, No. 1, 34, Item 01D2 (January 1970)

Artificial milk is made by heating to liquefaction a mixture made up of 40 percent (by weight) water, 32 percent coconut oil, 2.8 percent cocoa butter, and 1.6 percent vegetable shortening; mixing in 4 percent sugar; adding 5.6 percent albumin, and then homogenizing the entire mixture.

[Extracter: L. Baldwin]

6.32 RELATION BETWEEN THE GROWTH OF RISHIRI-KOMBU, LAMINARIA OCHOTENSIS, AND ITS FREE AMINO ACID COMPOSITION

Oishi, Keiichi, Naomichi Kunisaki, and Ayako Okumura (Laboratory of Seafood Chem., Hokkaido Univ., Hakodate 040, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 12, 1189-1192 (December 1969) (In Japanese; figure, table, and summary in English)

Four groups of Laminaria ochotensis were separated according to age: (1) 1-year-old plants, (2) undiscriminated 1- and 2-yr.-old plants, (3) 2-yr.-old plants (first grade), and (4) 2-yr.-old plants (second grade). Chemical analysis of the base and the central part of the blade of specimens from each group revealed the following. Plants in Group 1 contained more glutamic and aspartic acid than did plants in Group 3 or 4. The ratio of glutamic acid to aspartic acid was about 1:1 in Group 1 and 2 plants and about 2:1 in Group 3 and 4 plants. Proline content decreased with the size of the plant. Cystine appeared in Group 1 plants but not in Group 3 and 4 plants; where cystine appeared, tryptophan did not, and vice versa. Two peaks of unknown ninhydrin reactive substances appeared on the chromatogram, one between valine and methionine and one between leucine and tyrosine. [1 figure, 1 table, 3 references]

 Abstracter: L. Baldwin

6.34 INFLUENCE DU MODE DE CONSERVATION DES LAMINAIRES SUR LES QUALITÉS DE L'ACIDE ALGINIQUE [EFFECT OF METHOD OF PRESERVING LAMINARIA ON THE ALGINIC ACID QUALITIES]

Perez, R.
Science et Pêche, No. 187, 11 pp. (December 1969) (In French)

Storing laminaria is a problem principally because the products contained in the seaweed itself deteriorate rapidly as a result of the action of such bacteria as Bacterium alginovorum, B. alginicum, B. fucicola, B. terrestralginicum, and Clostridium alginovorum. To prevent, or at least to limit, this deterioration, one can (1) immerse the harvested laminaria in an antibacterial solution, the procedure being satisfactory only when formaldehyde is the bactericide, since other substances, though effective at very strong concentrations, make the procedure extremely onerous; (2) store the laminaria in an anaerobic medium, which reduces the pH and the rate of bacterial growth without altering the alginic acid content (Black, 1955); (3) dry the seaweed immediately after it is harvested. This third possibility not only reduces alginolysis but lowers by four-fifths the weight of the thalles and, thus, the cost of transportation.

In France, laminaria are still spread out on sand dunes to dry. A practice so outmoded, says the author, is incontestably the cause of France's backwardness in exploiting her algal resources. It makes life extremely hard for the seaweed harvesters, for it means added labor after a hard day's work at sea. Too often it results in heavy losses, for the harvest is constantly at the mercy of the elements. Evidently, then more modern methods of preservation are urgently called for.

(over)

 Abstracter: L. Baldwin

6.36 (0.4) SUPPRESSION OF LIPID SYNTHESIS IN CULTURED AORTIC CELLS BY LAMINARIAN SULFATE

Murata, K. (Dept. of Physical Therapy and Medicine, Univ. of Tokyo School of Medicine, Hongo, Bunkyo-ku, Tokyo, Japan)
Journal of Atherosclerosis Research 10, No. 3, 371-378 (November/December 1969)

Numerous studies have shown that some sulfated polysaccharides will ameliorate lipemia or atherosclerosis in animals. Jorpes (1946) and Izuka et al. (1968) reported having therapeutically applied heparin and chondroitin sulfates for lipemia in human atherosclerosis. In 1955, Hawkins et al. found that laminaran sulfate (prepared from Laminaria digitata) acted like heparin in prolonging blood coagulation time and in clearing alimentary lipemia. In 1962, the present author found that daily injections of sodium laminaran sulfate into cholesterol-fed rabbits reduced the elevation of serum lipids, lowered the cholesterol-to-phospholipid ratio and the β/α lipoprotein ratio, and inhibited experimental atherosclerosis. He hypothesized that laminaran sulfate may inhibit atherosclerosis either by inhibiting arterial lipid synthesis, or by preventing lipid synthesis in other organs and/or preventing lipid transport to arterial tissue, or by enhancing the excretion of synthesized lipids from the circulating blood or arterial tissue. In this study, he examines the first possibility in vitro using chick aortic cells and laminaran sulfate prepared from the marine brown algae Eisenia bicyclis (Laminariaceae).

(over)

 Abstracter: L. Baldwin

6.4 EPOXIDATION OF FISH OIL. KINETIC AND OPTIMIZATION MODEL

Wisniak, Jaime, and Eduardo Navarrete (Department of Chemical Engineering, Universidad Católica de Chile, Santiago, Chile)
Industrial & Engineering Chemistry Product Research and Development 9, No. 1, 33-41 (March 1970)

Vegetable oils are used for the preparation of epoxy plasticizers for polyvinyl resins because of their low cost and low iodine value. The degree of compatability (with the base material) and stability of an epoxidized vegetable oil increases with purity, oxirane number, and residual iodine value. (The oxirane ring of the epoxy plasticizer can neutralize quantitatively the hydrochloric acid generated in the decomposition of polyvinyl chloride. The plasticizer provides for greater resistance, stability, and flexibility of polyvinyl resins.) To produce plasticizers with an oxirane number of 9 or higher, the unsaturation of the vegetable oils must be improved to about 200. But, this improvement increases the cost of the raw material. In the present study, the researchers explored the possible use of fish oils that normally have a relatively high iodine value (180 to 220). Earlier work showed that fish oils could be epoxidized by standard procedures to produce oxirane numbers of about 7.8, but the resulting product was not entirely satisfactory because of its high residual iodine value and low thermal resistance. The present studies were carried out with the aim of developing a kinetic model for the reaction and to optimize the conversion of the double bonds to oxirane rings.

(over)

 Abstracter: F. T. Piskur

6.34

On the basis of studies made up to now, the three methods set forth above seem to have nearly the same advantages. However, one point needs clarifying: How does each affect the principal quality of alginic acid--its viscosity? The author seeks to answer this question.

First the procedure for extracting alginic acid and the method of measuring its viscosity are explained. Then each possible method is tested on Laminaria digitata, and the results of the tests are tabulated. (Freeze-drying was not included because of its cost.) The pertinent findings are shown in the accompanying table. Values for viscosity are the maximum obtained during each set of tests. The values for dune drying were used as a standard.

Method of preservation	Alginic acid	
	Viscosity	Content
	(centipoise)	(percent)
Anaerobic medium: cut alga	177	20
whole alga	108	26
Formol solution (5 percent)	2,800	~25
Vacuum drying (60° C., 7 hr.)	1,300	26.2
Drying in moving air (20° C., 5 hr. 40 min.)	4,500	25.7
Flash drying (600° C.)	3,480	26
Conventional dune drying	3,560	27

The exceedingly low viscosity values for laminaria kept in the anaerobic medium are ascribed either to the results of autolysis or to fermentation, brought on by the joint action of C. alginovorum and Desulfovibrio desulfuricans. The author does not recommend this method, since the degradation mechanism is not clear and cannot be controlled. Of the three most promising methods--formolization, drying in moving air, and flash drying--he recommends the last, for it permits great quantities of seaweed to be dried for a reasonable cost and without degradation of the alginic acid. [3 figures, 4 tables, 20 references]

6.32 AMINOSULFONIC ACIDS IN SIX SPECIES OF MARINE ALGAE

Miyazawa, Keisuke, Keiji Ito, and Fumio Matsumoto (Faculty of Fisheries and Animal Husbandry, Hiroshima University, Fukuyama, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 12, 1215-1219 (December 1969)

The authors investigated aminosulfonic acids in one green alga (Caulerpa okamurai), one brown alga (Hijikia fusiforme), and four red algae (Gelidium amansii, Gloiopeltis furcata, Grateloupia livida, and Laurencia intermedia). Taurine was found in all the algae; it was the sole aminosulfonic acid in Gloiopeltis furcata and Caulerpa okamurai. In addition, N,N-dimethyltaurine was found in Gelidium amansii and Laurencia intermedia, with markedly high concentrations appearing in the former. D-Cysteinolic acid was isolated from Hijikia fusiforme, and two unidentified aminosulfonic acids, which the authors plan to report on in a forthcoming paper, were separated from Grateloupia livida.
[2 figures, 1 table, 5 references] [Abstracter: L. Baldwin]

6.33 [METHOD OF SALTING MEAT IN THE PRODUCTION OF SMOKED PRODUCTS] (3.8)

U.S.S.R. Patent 244,877 (1969)
Gorbatov, V. M., L. A. Bushkova, and L. A. Borodulin (pat.)
Food Science and Technology Abstracts 2, No. 1, 131, Item 01512 (January 1970)

Adding a gelling agent, such as agar, at a concentration of from 0.1 to 1.0 percent to the preservative reduces loss of extracted substances during pickling and improves the quality of the finished product. [Extracter: L. Baldwin]

6.4

Anchovy oil of iodine value of 188.8 was epoxidized in situ with preformed peracetic acid or using a mixed strategy. In the range of the operating variables used, the epoxidation and ring opening may be described by a pseudo-first-order reaction, and use of a mixed strategy provides a 92.2 percent conversion of the double bonds with a final oxirane number of 8.5 and iodine number of 19.4. Optimum conditions are an in situ process at 70° C. with partially preformed peracetic acid and fast addition of oil, using 6.16 moles of 41 weight percent hydrogen peroxide and 0.5 mole of acetic acid per mole of ethylenic unsaturation in the presence of 10 weight percent dry basis of resin catalyst Dowex 50W-12X, 50/100-mesh. The thermal stability of the epoxidized anchovy oil compared favorably with that of commercial polyvinyl chloride plasticizers.
[11 figures, 7 tables, 14 references]

6.54 FISH PROTEIN PRODUCT

Canadian Patent 827,090
Libenson, C. A., I. Pitosky (pat.)
Food Technology 24, No. 3, 57 (March 1970)

A fish protein product is prepared by a series of steps involving alkaline hydrolysis, centrifugation, acidification, recentrifugation, realkalization, and further recentrifugation. [Abstracter: F. T. Piskur]

6.36

The results show that laminaran sulfate will substantially suppress lipid synthesis in cultured aortic cells, the suppression depending on the concentration of the laminaran sulfate and the incubation time of the cells in the substance. Synthesized total lipids and free sterol were 75 and 60 percent, respectively, of control values at 10 µg. laminaran sulfate concentration and 53 and 45 percent at 40 µg. concentration; after laminaran sulfate treatment, lipid synthesis was 95, 77, and 73 percent of the 0 time value at 24, 48, and 72 hours, respectively. The author suggests that the greater inhibition of sterol synthesis than of phospholipid synthesis found in this study may explain the decreased serum cholesterol: phospholipid ratio found in the 1962 in vivo experiments.
[3 figures, 2 tables, 33 references]

6.37 FLAVOR IMPROVER

Japanese Patent 20,385/69
Chlorella Kogyo K.K. (pat.)
Food Technology 24, No. 3, 56 (March 1970)

The product consists of crystalline compounds prepared from extracts of Chlorella. [Abstracter: F. T. Piskur]

6.50 PHOSPHATE COMPLEXES OF SOLUBLE FISH PROTEINS. THEIR FORMATION AND POSSIBLE USES

Spinelli, John, and Barbara Koury (Bureau of Commercial Fisheries, Technological Laboratory, 2725 Montlake Boulevard East, Seattle, Washington 98102)
Journal of Agricultural and Food Chemistry 18, No. 2, 284-288 (March-April 1970)

The purpose of this work was to study the use of condensed phosphates to recover soluble protein from fish plant effluent. The specific objectives were: (1) to determine the efficacy of certain condensed phosphates in precipitating protein from dilute aqueous solutions, (2) to determine the nutritive value of complexes of sodium hexametaphosphate and the sarcoplasmic proteins from fish tissue, and (3) in a preliminary way, to determine if a selected condensed phosphate could be applied in the recovery of protein from the effluent of fish plants.

Sarcoplasmic proteins from the flesh of the rockfish Sebastodes melanops were used. The condensed phosphates used were metaphosphoric acid, sodium trimetaphosphate, sodium hexametaphosphate, and sodium tetrametaphosphate. The test solution consisted of sarcoplasmic protein in distilled water at the 1 percent concentration level.

The efficiency of flocculation of the protein by the phosphates was directly related to the molecular size of the phosphate moiety. The sarcoplasmic protein (in a 1-percent solution) was completely precipitated by sodium hexametaphosphate at a concentration of 0.01 M and pH of 4.0. The authors suggest that use of condensed phosphates for precipitating soluble protein may offer a method for recovering waste proteins from effluents from fish plants.

[5 figures, 3 tables, 15 references]

 Abstracter: F. T. Piskur

8.0 VARIATIONS IN PROXIMATE COMPOSITION OF NORTH CAROLINA SCALLOP MEATS

Webb, N. B., F. B. Thomas, F. F. Busta, and R. J. Monroe (Department of Food Science and Experimental Statistics, North Carolina State University, Raleigh 27607)
Journal of Food Science 34, No. 6, 471-474 (November-December 1969)

This paper reports on the proximate composition of the meats of scallops taken from various locations off North Carolina during various months of the year. Such data are useful for developing methods of commercial culture and of improving processing and storage techniques.

At selected periods and intervals during the years 1965-67, scallops were collected from sites in Bogue and Core Sounds, North Carolina. The species included bay scallops (Aequipecten irradians), calico scallops (A. gibbus), and sea scallops (Placopecten magellanicus). For comparative purposes, a sample of scallops (Chlamys hericius) was obtained from a site off Whidbey Island, Puget Sound (Washington). The adductor muscles of the scallops were analyzed for total moisture, protein, fat, glycogen, and ash.

The proximate composition of the scallop meats varied widely between locations and between months of harvesting. The coefficients of variation were relatively low for moisture and protein and high for fat, glycogen, and ash. The range of values for each component was fairly similar among the species of scallops. The range of composition values for bay, sea, and calico scallop meats are shown in the following table.

(over)

 Abstracter: F. T. Piskur

7.80 HEDONIC DIFFERENCES AS A FUNCTION OF NUMBER OF SAMPLES EVALUATED

Kamen, J. M., D. R. Peryam, D. B. Peryam, and B. J. Kroll (Peryam and Kroll Research Corporation, Chicago, Illinois)
Journal of Food Science 34, No. 6, 475-479 (November-December 1969)

The purpose of this study was to determine the number of samples that can be reliably evaluated for preference in a single laboratory test session. The basic question that this study considered in order to arrive at an answer to the problem was: Do differences in preference between food samples of the same subclass remain constant as the number of samples is increased?

Multiple samples of a specific food were presented to 200 subjects randomly assigned to 5 conditions. Two critical test samples were included under each condition and the number of other samples was varied from 0 to 4. Two replications of each set of samples were evaluated by each subject in a single session without his knowledge that the sets were repeated. The total number of samples for the five experiments was 4, 6, 8, 10, and 12. The test food products used were milk, a soup-and-gravy base, and maple syrup.

The authors found no evidence that serving up to 12 samples in a single session adversely affected preference discrimination.

[7 tables, 8 references]

 Abstracter: F. T. Piskur

9.11 (2.148)(1.9) RELATION BETWEEN OCEANOGRAPHICAL CONDITIONS AND CATCH OF THE SAURY IN THE EASTERN SEA OF KOREA

Han, Hi Soo, and Yeong Gong
Bulletin of Fisheries Research & Development Agency No. 3, 45-56 (1968) (In Korean; figures, table, and summary in English)

Because saury is one of the most important commercial fishes caught along the coast of Korea, the authors studied the effect of oceanographic conditions on the catch. They found that surface temperatures on saury fishing grounds ranged from 9° to 21° C. and salinities from 31.00 ‰ to 34.70 ‰. The best temperature for a good catch was 15.44° C., but good catches were also possible when the water temperature was anywhere in the 13- to 18-degree range. Good fishing was also possible in waters having a salinity of greater than 33.00 ‰. Classifying oceanographic conditions according to location and forms of boundary zone, the authors found that saury fishing in May and June over an 18-year period (1950-1967) conformed to the following pattern: very good in areas where the boundary zone was distinct, poor to good in areas where currents were warm, poor where there was coastal upwelling, and very poor where currents were cold. On the basis of these findings, they conclude that warm water will not insure a good fishery but widespread cold water will insure a poor one.

[7 figures, 1 table, 18 references]

 Abstracter: L. Baldwin

7.85 BACTERIOLOGICAL STANDARDS FOR FISH AND FISHERY PRODUCTS

Shewan, J. M. (Torry Research Station, Ministry of Technology, Aberdeen, Scotland)
Chemistry and Industry No. 6, 193-199 (February 7, 1970)

The purpose of any standard, specification, or limit (suggested or in operation) is to insure that products reaching the consumer are of good eating quality; have a good shelf life; and are wholesome, free from toxin, and free from food poisoning pathogens or other food-borne infections. In this review, the author discusses the situation, worldwide, relative to food poisoning and bacteriological standards for fish and fishery products. Several tables are presented summarizing data on examinations of food products for salmonellae, geographic distribution of verified Type E botulism outbreaks, bacterial counts of newly caught and market fish in the United Kingdom, and total counts, coagulase-positive Staphylococci and coli-aerogenes in various fisheries products, and miscellaneous bacteriological data on various fishery products. Two tables are given showing some suggested bacteriological standards for various fishery products and commodities from various sources. [10 tables, 76 references] [Abstracter: F. T. Piskur]

7.85 (9.3) MICROBIOLOGICAL STANDARDS FOR FOODS

Davis, J. G.
Laboratory Practice 18, No. 7, Part I, 749-753, 764 (July 1969); 18, No. 8, Part II, 839-844, 854 (August 1969)

Foods may be examined microbiologically for public health safety and for commercial keeping quality. The author discusses the general procedures and principles for both purposes. He proposes a scheme for standards for advisory purposes but believes our present knowledge of the subject is not adequate to attempt any general system of legal microbiological standards for foods.
[17 tables, 62 references] [Abstracter: F. T. Piskur]

6.82 (6.55) A REPORT OF PAPERS PRESENTED AT THE ANNUAL MEETING OF THE POULTRY SECTION, ASSOCIATION OF SOUTHERN AGRICULTURAL WORKERS

Couch, J. R. (Department of Poultry Science, Texas A & M, College Station, Texas)
Feedstuffs 42, No. 11, 66-70 (March 14, 1970)

At the annual meeting of Southern Agricultural Workers, 42 papers were presented. They dealt with broiler production, nutrition and management of commercial layers, phosphorus availability, antibiotics and arsenicals, manganese availability, litter management, lighting, and housing temperatures. In one of the 42, researchers from the University of Georgia compared oyster shell and limestone as sources of calcium for Leghorn hens. They divided 6,000 1-year-old hens into two treatment groups. Both groups were fed a commercial laying ration, but dietary calcium was supplied by ground limestone to one group and by oyster shell to the other. The specific gravity of the shells was determined for eggs collected at the beginning, the middle, and the end of the automatic feeding experiment. These determinations indicated that hens receiving dietary oyster shell will produce a heavier egg shell than will hens receiving calcium from ground limestone. Other results are tabulated below.

Source of dietary calcium	Defective shells		
	Total	Cracks and checks	Leakers and soft shells
	percent	percent	percent
Ground limestone	8.4	0.93	7.5
Oyster shell	4.3	1.4	2.8

[Abstracter: L. Baldwin]

9.12 (9.3)(1.3) CALCULATION OF THE PROPORTION OF LOCAL STOCKS IN THE TOTAL STOCK OF SOCKEYE SALMON [ONCORHYNCHUS NERKA (Walb.)] IN THE KAMCHATKA RIVER BASIN

Krogius, F. V. (Kamchatka Department, Pacific Research Institute for Sea Fisheries and Oceanography-TINRO, Petropavlovsk, U.S.S.R.)
Problems of Ichthyology 8, No. 6, 779-783 (1968)

The author's thesis is that the proportion of the various local stocks of sockeye salmon in the total sockeye stock that breed in the Kamchatka River basin can be estimated by determining several unknowns from a system of condition equations by the method of least squares. His calculations are based on data he reported in a previous paper (1968). Three characters that typify the sockeye of the various stocks were selected for use in the calculations: age composition, growth increments during the fresh-water period, and the nature of the margin to the fresh-water zone of the scale.

The first character gave the most reliable results; the last, the least reliable. When the stocks differed sufficiently with respect to the characters selected, the method gave excellent results. The author points out, however, that the material considered is not extensive enough for a reliable study of the composition of the sockeye stock in the Kamchatka River--he gives these calculations simply to demonstrate the method. [2 tables, 2 references]

[Abstracter: L. Baldwin]

8.0

Component	Range of composition of meats from:		
	Bay scallops	Calico scallops	Sea scallops
	percent	percent	percent
Moisture	74.15-83.66	76.12-81.86	74.63-80.97
Protein	13.44-21.57	13.28-17.53	13.87-18.11
Fat	0.23- 0.91	0.23- 1.13	0.31- 0.96
Glycogen	0.13- 3.86	0.35- 3.71	0.27- 8.74
Ash	1.09- 2.24	1.17- 1.91	1.28- 1.81

[5 tables, 10 references]

8.59 (0.38) HORSESHOE CRAB LACTATE DEHYDROGENASE: TISSUE DISTRIBUTION AND MOLECULAR WEIGHT

Massaro, Edward J. (Department of Biochemistry, State University of New York at Buffalo, Buffalo, N.Y. 14214)
Science 167, No. 3920, 994-996 (February 13, 1970)

The lactate dehydrogenase (LDH) from horseshoe crab, Xiphosura (Limulus) polyphemus, is D(-)-lactate specific. The LDH does not use L (+)-lactate, α-hydroxybutyrate, α-hydroxyvalerate, or α-hydroxyisocaproate as substrate. The LDH in most tissues consists of five isozymes with a molecular weight of about 140,000 each (as determined by gel-filtration chromatography). Apparently, the LDH of the horseshoe crab, as in vertebrates, is a tetrameter comprised of varying amounts of two physicochemically distinct subunits.
[2 figures, 15 references] [Abstracter: F. T. Piskur]

9.13 (0.38) EFFECT OF FEEDING AND OF DDT ON THE ACTIVITY OF HEPATIC GLUCOSE 6-PHOSPHATE DEHYDROGENASE IN TWO SALMONIDS

Buhler, Donald R., and P. Benville (Bureau of Commercial Fisheries, Fish Pesticide Research Laboratory, Columbia, Missouri)
Journal of the Fisheries Research Board of Canada 26, No. 12, 3209-3216 (December 1969)

The concentration of certain hepatic enzymes in mammals are influenced by dietary factors--for example, earlier workers have shown that the specific activity of liver glucose 6-phosphate dehydrogenase (G6-PdH) decreases in rats during starvation and then increases sharply after refeeding with a diet containing large amounts of carbohydrate. Also, the specific activity of liver G6-PdH is decreased in rats fed a ration containing the insecticide DDT.

G6-PdH is a key enzyme in carbohydrate metabolism because it helps to control the relative flow of glucose through the Embden-Meyerhof glycolytic pathway and the pentose cycle. In the dehydrogenation of glucose 6-phosphate by G6-PdH, NADPH is produced, and is in turn utilized, among a number of biosynthetic processes, especially in the synthesis of fatty acids. The level of G6-PdH in an organism may help to regulate lipogenesis even though the amount of NADPH produced by way of the pentose cycle is insufficient to account for all fatty acid synthesis. Or, the level of lipogenesis or other activities that require NADPH may control the activity of G6-PdH. (various authors)

(over)

 Abstracter: F. T. Piskur

9.16 (1.88)(9.17) METODOS Y RECOMENDACIONES PARA EL ENCORDAMIENTO DE QUILMAHUES Y CHOLGAS
[METHODS AND RECOMMENDATIONS FOR RAISING MUSSELS ON CORD]

Anonymous (Department of Natural Resources, Mollusk Section)
IFOP Circular No. 51, 15 pp. (December 1969) (In Spanish) (Instituto de Fomento Pesquero, Santiago, Chile)

Indiscriminate exploitation of the three commercial species of Chilean mussels (quilmahue, Mytilus edulis chilensis; choro, Choromytilus chorus; and cholga, Aulacomya ater) has caused a pronounced decline in the number of spawners. The decrease is particularly marked by the paucity of spat in the beds off Llanquihue Province and Chiloé Island. The severe decrease in the number of spawning mussels has reached such a critical point that annual recruitment cannot counteract the mortality produced by harvesting. The only solution is to grow these mollusks artificially. But the actual state of the resource in Llanquihue and Chiloé prevents collection of eggs and spat there in sufficient quantities to start any large-scale operation. The only alternative is to start, as a preliminary step toward artificial cultivation, spawning beds by gathering spawners into those places that have proved to be a good place for mussels to live and then to protect these isolated spots from the diver and the dredge. Until the mussels from these beds are able to sustain the resource, it is necessary to collect larvae elsewhere and place them on cords so they can grow to maturity.

To determine the best procedure for growing mussels on cords, IFOP built three framelike floats, about 16 m. square, and anchored one off the coast of Mejillones, in the north, and the other two in Tubildad Bay, in the south. Cholgas

(over)

 Abstracter: L. Baldwin

9.16 (1.85) PROFIT FROM PRAWN SPAWN

Anonymous
U.S. Patent 3,473,509
Marifarms Inc., Delaware (pat.)
New Scientist 45, No. 686, 205 (January 29, 1970)

In some fashionable restaurants, giant Mediterranean prawns cost as much as 40¢ each. If only half of the 1,000,000 eggs that a female prawn usually releases should grow to full size, the prawn culturist would have access to a worthwhile profit. The Marifarms patent described here is designed to achieve this goal.

The procedure is as follows. (1) Put a dozen or so fertilized female prawns in a darkened tank filled with 25° C. aerated sea water and leave them there till one or more have spawned (indicated by large quantities of bubbles appearing at the surface). (2) Remove the adults and reduce the rate of aeration to a breath. (3) As soon as the larvae begin to suspend themselves, resume the aeration rate, keeping the temperature at 25° C. (4) After 1 day's growth, start feeding them phytoplankton; don't change the water unless they show signs of sluggishness in response to a bright light. (5) As the larvae grow, change the food--first to zooplankton, then (at the mysis stage) to one that includes the eggs of brine shrimp; again do not change the water unless the larvae begin to die. (6) When the young prawns are about 10 mm. long, lower the temperature of the water a degree or two and change the food to include ground mussels, clams, and bivalve meat. (7) Finally, when they reach 20 mm. in length, transfer them to an outdoor

(over)

 Abstracter: L. Baldwin

9.17 COMMENTS ON AN INTERDISCIPLINARY SOCIAL SCIENCE APPROACH FOR CONSERVATION ADMINISTRATION

Henning, Daniel H. (Political Science Department, Eastern Montana College, Billings)
BioScience 20, No. 1, 11-16 (January 1970)

Present specialized management disciplines are not getting at the essentials of resource conservation. The values and competition of human beings are the predominant influence on natural resources. Hence an interdisciplinary social science approach to conservation administration is indicated, for it can provide a conceptual framework for the identification and analysis of factors and values germane to the problem. A single discipline or management approach precludes a comprehensive perspective of these values. Since natural-resource administrators are basically involved in managing people, their major concern during the decision-making process is with value determinations--for present and future generations.

After a general defense of this basic premise, the author considers various disciplines (for example, political science, several of the social sciences, animal behavior, ecology, economics) as instruments for increasing the scope and depth of the multidiscipline approach. Concluding the discussion is a case study that is used to illustrate the application. Conservation in this paper is limited to those areas concerned with renewable natural resources--water, wildlife, forests, and soil. [1 figure, 10 references]

 Abstracter: L. Baldwin

9.2 (1.87)

SPINY LOBSTER TAILS

Kensler, Craig B. (present address, U.S. Bureau of Commercial Fisheries, Biological Laboratory, West Boothbay, Maine 04575)
Commercial Fishing 8, No. 11, 35-37 (November 1969)

Since the end of World War II, the United States has become the largest consumer of spiny lobster tails in the world. Because domestic supplies (about 2,000,000 lb. in 1968) cannot fill the demand, she is also the largest importer (35,800,000 lb. in 1968) of lobster tails in the world. Between 1960 and 1968, she imported 268,200,000 lb., the major part coming from southern Africa (36.0 percent), Australia (28.0 percent), Brazil (10.5 percent), and New Zealand (10.0 percent). Over the last 5 years of that period, Australia and New Zealand supplied almost 40 percent of the total.
[2 figures, 2 tables]

[Abstracter: L. Baldwin]

8.53

WAX ESTERS IN MARINE COPEPODS

Lee, Richard F., Judd C. Nevenzel, and G. A. Paffenhöfer (Scripps Institution of Oceanography, University of California at San Diego, La Jolla 92037)
Science 167, No. 3924, 1510-1511 (March 13, 1970)

The pelagic copepods Calanus helgolandicus and Gaussia princeps contained wax esters with 28 to 44 carbon atoms as major lipid constituents. The wax esters apparently serve as a store of reserve energy in the organism.
[2 tables, 14 references]

[Abstracter: F. T. Piskur]

9.13

The present paper reports on the effects of starvation and of feeding on the activity of hepatic glucose 6-phosphate dehydrogenase in fish. Also, the effects of dietary DDT and the hormone insulin on the enzyme are examined.

The authors found that the specific activity of liver glucose 6-phosphate dehydrogenase in yearling rainbow trout remained unchanged when the fish were starved for periods of as long as 8 weeks and when starved animals were fed diets of various composition. Injection of insulin concurrently with refeeding failed to alter the specific activity of the enzyme in trout. (In mammals, the activity of hepatic 6-phosphate dehydrogenase was markedly stimulated after refeeding starved animals or injection of insulin.)

Ingestion of DDT by juvenile coho salmon or adult rainbow trout had no effect on the specific activity of liver G6-PdH, and DDT failed to inhibit the rainbow trout enzyme in vitro.

Glucose 6-phosphate dehydrogenase in teleosts may be under a different type of regulatory control from that type found in mammals.
[5 tables, 27 references]

9.16

pond that is regularly flushed with warm sea water and continue feeding them with plankton, ground clams, and ground mussels till they reach marketable size.

The key to the success of the process is twofold: providing food at a rate sufficient to keep the larvae and the young prawns from eating each other and keeping them healthy and free of predators.

9.19 (9.15)(1.36) (1.92)

RELATIONSHIP OF RIVER POLLUTION TO BACTERIAL INFECTION IN SALMON (SALMO SALAR) AND SUCKERS (CATOSTOMUS COMMERSONI)

Pippy, John H. C., and Gerald M. Hare (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick)
Transactions of the American Fisheries Society 98, No. 4, 685-690 (October 1969)

Aeromonas liquefaciens is a ubiquitous water bacterium that causes disease and death in fishes whose resistance is low. In June 1967, when river temperature was 22.5° C., pollution-control measures at a base metal mine on the Tomogonops, a tributary of the Northwest Miramichi River (New Brunswick), temporarily failed. About 39 hr. after the failure, the copper and zinc content of the water was measured at 1.1 toxic units (1.0 toxic units is just lethal to juvenile Atlantic salmon at summer temperatures).

According to field records, the many suckers, shiners (Notropis cornutus), and salmon grilse that were found dead in the Northwest Miramichi between June and August had died of bacterial infection, the symptoms conforming to those caused by Aeromonas and Pseudomonas.

In June and July 1968, an epizootic among suckers developed in the Northwest Miramichi. River temperatures were high, water flow was unusually low, and a buildup of A. liquefaciens followed. Diseased salmon were found in the main Southwest Miramichi, suggesting to the authors that the disease originating in the Northwest branch of the river had spread.
[4 figures, 9 references]

[Abstracter: L. Baldwin]

9.19 (9.13)

STUDIES ON THE METABOLISM OF PENTACHLOROPHENATE, A HERBICIDE, IN AQUATIC ORGANISMS. I. TURNOVER OF ABSORBED PCP IN TAPES PHILIPPINARUM

Kobayashi, Kunio, and Hiroshi Akitake (Lab. Fish. Chem., Fac. Agr., Kyushu Univ., Fukuoka, Japan), and Tetuo Tomiyama (Tokyo Univ. of Fisheries, Tokyo)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 12, 1179-1183 (December 1969) (In Japanese; figures, table, and summary in English)

^{14}C-labeled PCP (pentachlorophenate) dissolved in sea water was rapidly absorbed by the shellfish Tapes philippinarum. It quickly became distributed throughout the mollusk's various organs, being especially noticeable in the liver and the organ of Bojanus; thence, presumably, it was quickly eliminated. Most of the accumulated PCP in the tissues was not decomposed, whether in the free or the bound form. [3 figures, 1 table, 8 references]

[Abstracter: L. Baldwin]

9.16

were grown in the north and quilmahues and choros in the south. Suspended from the cross pieces were from 600 to 1,000 cords into which, at 25 or 30 cm. intervals, were inserted wooden or plastic pins (to help keep the spat from slipping). Small bags of fine rayon, which would disintegrate in about a week, were used to hold fertilized eggs on the cords. During the experiments, data for the following variables were taken: dates the eggs and spat were attached to the cords, size of the spat, length of time the spat were out of water, density of the spat on the cords, characteristics of the cords, cleanness of the spat, replanting and thinning procedures, date of harvest, dates and places for collecting spat, and types of collecting devices used. From these data, step-by-step procedures were derived and are given for the annual sequence of work required to operate a successful mussel farm. [2 maps, 2 tables, 4 photographs, 3 references]

9.19 (7.45) TOXIC EFFECT OF ELEMENTAL PHOSPHORUS ON L-CELLS CULTIVATED IN SUSPENSION

Li, M. F., G. S. Traxler, and L. M. Langille (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia)
Canadian Journal of Zoology 48, No. 1, 133-138 (January 1970)

The death of great numbers of herring (Clupea harengus) in Placentia Bay, Newfoundland, has been attributed to pollution by elemental phosphorus. In 1960, Isom, reporting on the toxicity of elemental phosphorus to fish, indicated that the tolerance limit for bluegill (Lepomis macrochirus) is about 0.1 mg./l. for 48 hours. Other species of fish are known to be sensitive at much lower levels--in 1968, Johnson reported that the sensitivity of different species of fish to pollutants varies. These reports emphasize the difficulty of using fish for bioassay of pollutants and indicate a need for a standard bioassay system divorced from the effects of pollutants on marine life. In the present report, the authors used L-cells grown in spinner culture to examine the effects of elemental phosphorus on cell replication and cellular morphology.

The rate of cell replication was progressively reduced as the concentrations of phosphorus were increased. When the cultures were treated with phosphorus at a level of 0.31 mg./l., cell replication was inhibited about 75 percent; at a level of 1.25 mg./l., replication was completely inhibited. The calculated correlation coefficient between phosphorus concentration (X) and percent inhibition (Y) was significant at the 1-percent level. The relation was linear and could be expressed by the equation $Y = 10.42X + 75.79$.

(over)

9.19 STUDIES ON THE POST-MORTEM IDENTIFICATION OF THE POLLUTANT IN FISH KILLED BY WATER POLLUTION. X. ACUTE POISONING WITH LEAD

Kariya, Teiji (Dept. Fish. Fac. Agr. Tohoku University, Sendai, Japan), Hideo Haga (Dept. Metal Eng., Miyagi Technical School, Natori), Yoshiko Haga, and Kunihiko Kimura
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 12, 1167-1171 (December 1969) (In Japanese; tables and summary in English)

The tissues of rainbow trout (Salmo gairdneri irideus) exposed to solutions of lead nitrate were examined. Solutions containing 3 p.p.m. Pb were fatal to the trout within 23 or 24 hr., the 48-hr. median tolerance limit was from 1 to 3 p.p.m. Pb. The nature of the water used in preparing the solutions affected the toxicity appreciably--water with an alkalinity of 2.0 meq./l. and a pH of 8.0 made the solutions markedly less toxic than did water with an alkalinity of 0.2 meg./l. and a pH of 6.4. Comparison of the distribution of lead in the body of a fish killed by a lead solution with that in the body of a fish soaked in a lead solution after death revealed that the gills of both contained the highest concentration of Pb; the muscles contained the lowest. Washing the bodies with running tap water for 24 hr. after death reduced the lead content by from 60.2 to 95.5 percent. [6 tables, 7 references]

9.19 (1.01111) COEXISTENCE OF A FISHERY AND A MAJOR INDUSTRY IN PLACENTIA BAY

Idler, D. R. (Fisheries Research Board of Canada, Halifax, Nova Scotia)
Chemistry in Canada (The Chemical Institute of Canada, 151 Slater Street, Ottawa 4, Ontario, Canada), 6 pp. (December 1969)

This report constituted the keynote address at the Pollution Conference of the Atlantic Section, The Chemical Institute of Canada, held August 24-26 at Saint Mary's University, Halifax, N.S. It traces the development of a pollution crisis in the fisheries of Placentia Bay (a recess in the south shore of Newfoundland) after a phosphorus plant was opened on Long Harbour (an arm of the Bay) and describes the steps taken to solve the crisis.

The fishery in Placentia Bay consists mainly of herring, cod, and lobster and incidentally of smaller quantities of scallop and other fish species; it supports about 275 fishermen. In December 1968, a large phosphorus plant was opened at Long Harbour; it employs about 375 people. The first fish mortalities occurred soon after the plant opened. The fish involved, herring, exhibited extensive hemorrhaging, particularly around the gills, and almost complete hemolysis of the blood cells. Toward the end of April, cod were found dead in Long Harbour; divers found large numbers of dead cod on the bottom there. Early in May, both the fishery and the plant were closed.

Before the plant was closed, the Canadian Minister of Fisheries and Forestry had the plant effluent examined in detail. In a water flow of about 8,000 gal./min., the following substances were discharged into the harbor (in lb./day, approximately):

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9.2 (1.85) WORLD DEMAND FOR SHRIMP & PRAWNS MAY OUTSTRIP SUPPLY DURING NEXT DECADE

Cleary, Donald P. (Division of Economic Research, Bureau of Commercial Fisheries, 7338 Baltimore Avenue, College Park, Maryland 20740)
Commercial Fisheries Review 32, No. 3, 19-22 (March 1970) [Reprint (Sep.) No. 863]

Past increases in the consumption of shrimp in the U.S. have been quite spectacular. What does the future hold? The answer to this question lies in an understanding of the determinants of shrimp consumption and how those determinants influence the level of consumption. Major determinants are price of shrimp relative to the general price level for consumer goods, price of competing foods, and income levels.

Statistical techniques make it possible to isolate and measure with some degree of precision the importance of these determinants of shrimp consumption. An application of these techniques indicates that income and price of shrimp are very influential determinants. These two factors, according to the analysis, accounted for 90% of the change in per-capita consumption since 1950. In the analysis, per-capita consumption was expressed as a mathematical function of per-capita personal disposable income and the retail price of shrimp adjusted by the consumer price index. Two important observations can be made from this equation:

(1) Each 1% gain in per-capita real income tends to be accompanied by a 1.77% increase in per-capita shrimp consumption.

(2) Each 1% increase (relative to general price level) in the retail price of shrimp tends to be accompanied by a 0.46% decline in per-capita consumption.

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fluoride, 22,800; SO_2, 6,250; total P_4, 1,630; elemental P_4, 1,250; CN, 96; NH_3, 455; and solids (SiO_2, coke, and rock), 38,360. The toxicity of each of these materials to trout, salmon, herring, and lobsters was tested in Fisheries Research Board Laboratories. Phosphorus was very toxic to the vertebrate fish, a few parts per billion in the water being lethal; lobsters were more tolerant of this chemical. Fluoride was not lethal to the salt-water species under the test conditions, but fluosilicic acid, at the level it apparently flowed from the plant, was. The author adds that fluoride, because of the unacceptable acid condition it produces, should not be put into the marine environment. Suflur dioxide and ammonia were also toxic, 50 percent mortality occurring in trout after 15 hours' exposure to 1 p.p.m. sulfur dioxide or to 36 p.p.m. ammonia.

In mid-June, the Placentia Bay fishery was reopened everywhere but in Long Harbour. The Government's loans to fishermen (beginning May 15) and its purchase of all questionable fish (till July 12), coupled with the phosphorus company's decision to retain all future pollutants on the plant premises and to try to remove accumulations of pollutants from the floor of Long Harbour, changed the situation from a crisis to one where chances of success are excellent. The 3,800,000-cubic foot pond used to retain sediment dredged from the bottom of Long Harbour and the system now used to neutralize effluent from the pelleting plant are described.

Among the lessons learned from this experience are: too much reliance can be placed on dilution; the seriousness of water pollution is not necessarily related to the extent of the pollution (because fish move); fish are so sensitive to pollutants that they may be the first line of defense against pollution--that is, if the environment is safe for fish, it will probably be safe for other animals.
[8 figures, 2 tables, 1 map]

9.2

Knowing these relationships, we can predict with some reliability what consumption is likely to be--given changes in income and in price of shrimp.

Using the consumption equation explained above, per-capita shrimp consumption was projected into the future by assuming 2 things: (1) "real" price of shrimp will not increase, and (2) a series of changes in income will occur as projected by the National Planning Association.

Estimated per-capita consumption, multiplied by Census Bureau projected population, shows total U.S. consumption of shrimp can be expected to reach 562 million pounds (heads-off weight) in 1975, 797 million pounds in 1980 and, if supply is unlimited, 1.4 billion pounds in 1990, and 2.7 billion pounds in 2000.

Real personal disposable income is expected to increase at about 3% per year during the 1970s and 1980s. Since per-capita consumption increases 1.77 times as fast as per-capita personal disposable income, we can anticipate an increase in per-capita demand of over 5% per year. Also, population is expected to increase slightly more than 1% per year through the 1970s and 1980s. The combined effect of increasing real income and increasing population should result in a 6-7% growth per year in total demand. To offset increasing demand--and to hold total consumption constant after maximum harvest potential is reached--real price will have to increase by about 15% per year.

The possibility of shrimp and prawn harvests leveling off in the next decade while demand continues to climb is quite real. Shortages in natural supplies will force increasing attention to aquaculture. As prices increase, the development and use of higher cost methods will be stimulated. This illustrates the importance of considering future returns to aquaculture in planning development of U.S. and world estuarine areas. [2 figures]

9.19

The much more moderate effect of phosphorus on cell viability than on cell replication suggested that phosphorus may not totally destroy or kill the cells. To clarify the mechanism of action, the authors used the May-Grunwald-Giemsa staining technique on ribonucleoproteins and deoxyribonucleoproteins and the Feulgen technique for demonstrating deoxyribonucleic acid. Cells treated with various concentrations of phosphorus showed typical cytopathic changes. The control cells stained well and were uniform in size and shape, whereas the treated cells increased in size and had a tendency to lose their dye-binding capacity. These phenomena increased as the concentration of phosphorus was increased. The well-defined cytoplasmic membrane that could be seen in the control cells was not intact in the treated cells. The cytoplasm of these cells lost its homogeneity and became liquified; the enlarged nuclei with vacuolated nucleoli became hyperchromatic. Cells exposed to phosphorus formed multinucleated giant cells, and some of those that were undergoing mitosis seemed to be arrested in metaphase; short, thick chromosomes were distributed throughout the cell.
[14 figures, 1 table, 10 references]

9.19 STUDIES ON THE POST-MORTEM IDENTIFICATION OF THE POLLUTANT IN FISH KILLED BY WATER POLLUTION. XI. ON ACUTE POISONING WITH TIN PLATING SOLUTIONS

Kariya, Teiji, and Shuko Eto (Dept. Fish. Fac. Agr., Tohoku Univ., Kita-6, Sendai, Japan), Norio Yamaguchi (Fukushima Pref. Inn. Fish. Exp. Sta., Aizuwakamatsu), and Kaoru Suzuki

Bulletin of the Japanese Society of Scientific Fisheries 35, No. 12, 1172-1178 (December 1969) (In Japanese; tables and summary in English)

Two kinds of solution are commonly used in tin plating; alkaline and acid. The authors determined the survival time of goldfish (Carassius auratus) exposed to both kinds of plating solution and examined their bodies to determine the distribution of Sn therein. The 48-hr. median tolerance limit for both plating solutions was about 100 p.p.m. The bodies of fish killed by these solutions contained more than 13.0 γ/g. Sn; washing them in running tap water for 24 hr. after death did not purge them completely. Fish killed by tin-plating solutions showed concentrations of Sn in all parts of the body; fish killed and then soaked for from 15 to 24 hr. in the solutions showed Sn concentrations in the skin, gill, and muscle only (none appeared in the spleen, hepatopancreas, kidney, or digestive organs). The Sn content of fish killed by solutions containing organic tin compounds was much lower than that of fish killed by tin-plating solutions.
[9 tables, 3 references] [Abstracter: L. Baldwin]

9.3 FISHERIES MANAGEMENT AND THE LIMITATION OF FISHING
(9.17)

Gulland, J. A. (Fish Stock Evaluation Branch, Food and Agriculture Organization of the United Nations)
FAO Fisheries Technical Paper No. 92, iii + 13 pp. (December 1969)

Scientific studies have shown that measures for managing and regulating fish stocks can be classified as those aimed at controlling the total amount of fishing or those aimed at governing the size and other characteristics of the fish and the gear. This paper is concerned with the former.

The full benefits of regulating the amount of fishing require that two conditions be satisfied: (1) reduction of the fishing mortality coefficient to the desired level and (2) achievement of this reduction with the minimum loss in the efficiency of the fishing operations. Fishing mortality is most easily controlled by regulating some quantity--either catch or fishing effort--that is relatively easy to measure. In a fishery where several groups of fishermen participate, it is best measured, and the targets of regulation are best defined, in terms of catch. Whatever measure is used to limit the amount of fishing, however, the mechanism for ensuring that the limits are not exceeded is much more complex. For example, if fishing mortality is too high, it can be reduced by stopping all people from fishing some of the time (the single quota system), by stopping some people from fishing all the time (the limited entry system), by restricting the type of gear that can be used, or by combining some or all of these limitations.

Following a discussion of the advantages and complications of each method of controlling fishing mortality, the author suggests that the limited entry system,

9.4 THE STRATEGY OF FISHING--AN EXERCISE IN COOPERATIVE RESEARCH
(1.0111)(2.140)

Dickie, L. M. (Marine Ecology Laboratory, Bedford Institute, Dartmouth, Nova Scotia)
Sea Harvest & Ocean Science, pp. 33, 35-36 (February/March 1970)

Four features in the overall economic picture of Canada's fishing industry make further experiments in fisheries important. The first is that catch trends of a given country do not always follow the total trends. For example, after World War II, when total Northwest Atlantic catches rose rapidly, Canadian catches remained almost stationary and United States catches declined. But in 1961, when Canada began a fleet-renovation program, her catches began to increase steadily, whereas U.S. catches continued to decline. Evidently, says the author, economic policies--not restrictions on the available resource--control the catch. A second feature of the Canadian fishery is that her modernized fleets have done quite well in competition with other fleets--their catch per day and per man-hour is greater than that for any comparable-sized European (except possibly Spanish) or U.S. vessels. A third important feature is that the industry along Canada's east coast, encouraged by government, has undergone major plant renovations that have resulted in a steady increase in productivity per man and a renewed economic vigor. The fourth feature is that the basic cost of material--that is, of the fish--is the major cost factor in the fishing industry. Since the price paid for fish is about 70 percent of the total cost of the enterprise, and is rising, the major problem, aside from increasing the total yield, is decreasing the price of fishing while still ensuring a profit to the fisherman. It is to this feature that the article is oriented.

9.4 SURVEY REVEALS LIKES, DISLIKES OF ATLANTIC OFFSHORE FISHERMEN
(1.01111)(9.2)

Anonymous
Survey of the Labour Force in the Offshore Fishing Fleet, Atlantic Coast
John Proskie and Janet Adams
Issued by the Economics Branch of the Fisheries Service, Canadian Department of Fisheries and Forestry (n.d.)
Fisheries of Canada 22, No. 7, 7-9 (January 1970)

Data for the report summarized here were derived from questionnaires distributed in 1967 to captains and crewmen of Canadian offshore fishing vessels. Among the findings was the fact that 78 percent of those replying would not advise their younger children to go into offshore fishing because of the hard work, poor or uncertain earnings, long absences from home, the weather, long hours, poor or hazardous working conditions, and "general dislike" for the work. Ironically, those who liked offshore fishing cited the earnings, the time on shore, and the fondness for the work in general--the life on board, the job, the adventure, the chance for advancement, and the independence it gives. In regard to vessel preferences, respondents put most emphasis on better earnings, good working conditions, vessel performance, and modern equipment.

The report refers to the manpower problems plaguing deep-sea fleets in recent years and states that the factors contributing to the situation are mainly the working and living conditions on the vessels and the lack of contracts or guarantees covering employment and fringe benefits. Long working days and average earnings that are generally lower than those in other industries compound the

9.4 FISHERY EXTENSION ACTIVITIES EXAMINED BY BCF OFFICIAL

Anonymous
Fish Boat 15, No. 2, 23, 30-31 (February 1970)

The points in this article were extracted from a speech given by the U.S. Bureau of Commercial Fisheries' J. W. Slavin at the 20th annual meeting of the Gulf States Marine Fisheries Commission.

An extension service is an organized activity that is designed to provide technical assistance and educational information to the industry, the general public, and national and state governments. It identifies specific problem areas, stimulates work on solutions, communicates the results to the appropriate audience, and assists in implementing the indicated action. Compared with work that is being done by the Department of Agriculture, which has over 15,000 extension agents assisting the farmer, the work done on marine problems is very small. And it is exceedingly fragmented. Numerous state and federal agencies have technical assistance programs ranging in form from personal contact on the docks to academic research at Sea Grant colleges. Among these agencies is the Department of the Interior's Bureau of Commercial Fisheries (BCF). BCF has several extension-type programs: the Shellfish Advisory Service, the exploratory fishing and gear research activities, the environmental hygiene activity, advisory groups dealing with operational problems facing the breaded-shrimp industry and the smoked-fish industry, training programs for agricultural extension agents and food service people in the use of fishery products, and research groups who seek new uses of fishery products or better means of finding, extracting, and marketing fishery resources, to name a few.

9.4

situation and lead to a considerable turnover in crewmen and a reduction in productivity. The authors point out that injecting large amounts of capital into the industry for replacement and expansion of the offshore fleet without taking into account the offshore labor force will only create additional complex problems. They express the hope that their report will be a step toward an understanding of the offshore manpower problem and will lead to improvements in the overall situation. [2 graphs]

9.2 (1.0115) ECONOMIC IMPACT OF MARINE-ORIENTED ACTIVITIES--A STUDY OF THE SOUTHERN NEW ENGLAND MARINE REGION

Rorholm, Niels, H. C. Lampe, Nelson Marshall, and J. F. Farrell (Agricultural Experiment Station, Rhode Island University, Kingston)
Economics of Marine Resources No. 7, Bulletin 396, 143 pp. (1967)
U.S. Government Research and Development Reports 70, No. 1, 28 (February 10, 1970)
Available from the Clearinghouse for Federal Scientific and Technical Information, U.S. Department of Commerce, Springfield, Virginia 22151. Price $3.00, paper. Order No. PE-187682.

The primary purpose of the report is to analyze the economic impact of those commercial enterprises that depend upon the near-ocean and near-shore environment for their existence. [abstract copied in part]

9.3

if used alone, is the most satisfactory solution to the problem of rational management. However, since the single quota system is the best means of achieving the correct fishing mortality and the limited entry system, through a licensing procedure, is the best means of controlling the capacity of the fishing fleet, a combination of the two seems to be the overall best solution. Although such a combination makes regulation more complex, because of its reliance on two separate processes, it does emphasize the two rather separate objectives of fishery regulation--biological and economic.

The final section of the report deals with management of a multistock fishery --that is, a fishery in which several stocks of the same species inhabit the same areas or a fishery in which stocks of different species inhabit the same area and are, therefore, likely to be caught by the same type of fishing gear. The author concludes that a weighting system based on the exploitation status of a stock is the best means of protecting overly exploited stocks while at the same time encouraging fishing of under-exploited stocks. The system creates a number of problems (the most evident being waste) that can best be solved by permitting established quotas to be exceeded by a certain percentage when protected species are caught incidentally. [2 figures, 11 references]

9.4 (2.11) DIRECTORY OF SHIPOWNERS, SHIPBUILDERS, AND MARINE ENGINEERS 1970

IPC Business Press (Sales & Distribution) Ltd., Sundry Sales Department, 161-166 Fleet Street, London, E.C.4, England. Price £4.00 plus 5/-postage (US$11.00 including postage) pages >1,500.

The book covers the organizations of the marine industries throughout the world. It contains the names, addresses, telephone and telex numbers, and telegraphic addresses of companies that come under the category of shipowners, shipbuilders and repairers, dry dock owners, marine engine builders, container ship operators, ferry operators, tugs and surface craft operators, and marine consultants.

[Abstracter: F. T. Piskur]

9.3 SOVEREIGNTY AND JURISDICTION OVER AUSTRALIAN COASTAL WATERS

Lumb, R. D., and D. Phil (University of Queensland, Australia)
The Australian Law Journal 43, No. 10, 424-446 (October 31, 1969)

The author discusses recent developments concerning the law of the sea with particular emphasis on matters of fisheries jurisdiction.

[Abstracter: F. T. Piskur]

[contains 99 + 28 + 7 footnotes]

9.4

Because of the lack of central direction, the efforts of the state and federal agencies are not attaining maximum results. Presently the matter of strengthening and coordinating extension activities for fisheries is receiving Congressional attention. The Fisheries Omnibus Bill provides for development of a national fisheries extension program within the Department of the Interior. Before this program can evolve into an orderly, effective salient, however, many questions must be answered: What are other agencies doing in the fishery extension area? Should the program include all marine resources? Or just fisheries? Or just commercial fisheries? What audiences should the program be designed to reach? How should the program be carried out--that is, should the states be a part of the operational structure? What level of funding is necessary? BCF and other concerned agencies are in the process of answering these and other questions.

9.4

During preliminary investigations to learn the effect on cost reduction of a scientific approach to fishing, researchers at Bedford Institute found that random fishing by the Institute's research vessel produced essentially the same results as obtained by commercial fishermen who believed they were using information about the best fishing areas. Apparently there is a small-scale variation in local fish distributions that the fishermen are unable to interpret to best advantage (the possibility of large-scale effects as well was not ruled out). The researchers also found that catches of from 100 to 200 fish seem to come from discrete schools, whereas larger catches are the result of the net's encountering more, not larger, schools. Many fish that have escaped after being chased die from over-exertion (as evidenced by the relation between the lactic acid build-up and the mortality in these fish). Simple models of fish populations showed that changes in the radius of fish schools or of the distances between schools have as much effect on the catch per unit of time as do changes in abundance of fish. Using a games-theory matrix based on the catch distribution of several large trawlers over a fairly large fishing area, a cooperating Russian skipper was able to catch between 5 and 10 percent more fish than skippers fishing in the usual manner caught.

Now Institute scientists are not only refining the tools needed for a study of the potential of the "strategy" approach to cheaper fishing, they are enlisting the help of other government agencies, university scientists, and the industry. A new acoustic fish-counting device has been constructed; equipment has been compared with similar devices made in Europe; and mathematical and statistical techniques for use in sampling, including an operational model of the fleet operations, have been developed. The final step in evolving the strategy, which depends so much on a knowledge of fish school patterns, is to establish a relation between the degree of fish clustering and a physical index of environmental conditions.

0.6 PALLET-SHRINK ENTHUSIASM JUMPS THE OCEAN
(2.5)

Anonymous
Modern Packaging 43, No. 3, 58-62 (March 1970)

Shrink-film palletizing (shrinking a plastic material over and around a palletized load of product) was developed in Europe and has now been introduced into the United States. About 5 percent of the pallets used in the European Economic Community is being shrink wrapped and the percentage is expected to increase fourfold in the next 10 years.

Pallet wrapping of food and grocery products offers one of the most promising outlets for the technique. One major firm predicts a large change in distribution packaging in the next 10 years because of shrink wrapping. Shrink wrapping offers the following possibilities and advantages: (1) outdoor storage of food products in shedlike structures, (2) shipment of uncased products in open or flat-bed vehicles, (3) simplified disposal of shipping packaging material, (4) faster car unloading, and (5) consolidation of mixed loads from central warehouse to retail stores (minimizing in-transit damage, wrong-count deliveries, and pilferage).
[9 illustrations] [Abstracter: F. T. Piskur]

4.13 FATTY ACIDS OF LONG CHAIN LENGTH IN BALTIC HERRING LIPIDS

Linko, Reino R., and Hannu Karinkanta (Department of Chemistry and Department of Clinical Chemistry, University of Turku, Turku, Finland)
Journal of the American Oil Chemists' Society 47, No. 2, 42-46 (February 1970)

The fatty acids with carbon atoms exceeding 22 were isolated from the lipids of the flesh of Baltic herring and were identified. The herring were caught in May and in September 1967 in the Turku archipelago.

The flesh of the herring contained, on the average, 3.5 percent lipid in May and 7.2 percent in September.

The lipids of the herring caught in May contained 15 fatty acids with 24-32 carbon atoms; the lipids of fish caught in September contained 9 fatty acids with 24-28 carbon atoms. The authors postulated that the differences may be due to nutritional factors. The long chain fatty acids from the herring caught in September were tetracosanoic, 15-tetracosenoic, 12,15,18,21-tetracosatetraenoic, 9,12,15,18,21-tetracosapentaenoic, 6,9,12,15,18,21-tetracosahexaenoic, 17-hexacosenoic, 11,14,17,20,23-hexacosapentaenoic, 8,11,14,17,20,23-hexacosahexaenoic, and 4,7,10,13,16,19,22-octacosaheptaenoic acids.
[3 figures, 3 tables, 21 references] [Abstracter: F. T. Piskur]

3.2383 FROZEN FOOD PACKAGE

U.S. Patent 3,464,833
Mayo, F.; Fishery Products Ltd. (pat.)
Food Technology 24, No. 3, 56 (March 1970)

The package involved is the type commonly used for the irregular forms of wet food such as fish. The packages are compressed and frozen. The present patent covers a package in which the inner surface has depressions so that air can escape during the compression and freezing step. [Abstracter: F. T. Piskur]

Tests conducted by the Institute of Biochemistry and Technology show that small pieces of ice packed in waterproof plastic bags are a better refrigerant for both whole fish and fish fillets during transport than conventional loose ice is. [5 references] [Extracter: L. Baldwin]

3.25 FISCH-KÜHLUNG MIT LOSEM KLEINEIS ODER NICHTANSSEND VERPACKTEM KLEINEIS IN FOLIENBEUTELN [FISH REFRIGERATION WITH SMALL PIECES OF ICE EITHER LOOSE OR IN SMALL PLASTIC BAGS]

Flechtenmacher, W.
Verpackungs-Rundschau 20, No. 9, 1236-38, 1240, 1242, 1244, 1246 (1969)
Food Science and Technology Abstracts 2, No. 1, 33, Item 01F67 (January 1970)

9.6 THE COMMONWEALTH IN OCEAN FISHERIES
(9.2)(9.3)
Christy, Francis T., Jr., and Anthony Scott
International Marine Publishing Co., Camden, Maine (n.d.), 294 pp. $6
National Fisherman 50, No. 11, S2 (March 1970)

This book is concerned with the economic forces that presently govern, and will continue to govern, use of fish resources. The first part of the book deals with the common property aspects of fisheries; it contains background material on the physical productivity and potential of the ocean and on supply and demand situations and prospects. The following part deals with the legal principles that guide the use of the seas. The authors conclude that new formulations, procedures, and kinds of regulations are needed if the fisheries of the world are to be utilized in an orderly and rational way. [Abstracter: L. Baldwin]

Part I covers water, oxygen, feeding, and growth rate. The sections are labeled Water, Oxygen Content, Oxygen, Feed and Length, Kind of Feed and Amount, and Water Diversion. [4 figures, 3 tables]

Part II (in 14, No. 5, 8-10, the January-February 1970 issue) covers planning, constructing, and operating a trout hatchery. The sections are labeled Counting Fish, Grading and Cannibalism, The Egg Basket, and Trout Eggs. [4 figures, 1 table, 2 specification plans] [Abstracter: L. Baldwin]

9.6(1.37) PRODUCTION AND SALE OF RAINBOW TROUT.

Dey, Marcus (Prospect, Oregon)
American Fishes and U.S. Trout News 14, No. 4, 10, 12-15 (November-December 1969)

This handbook for the beginning trout farmer is being published serially in American Fishes and U.S. Trout News.

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Sano, Yoshihiko	14	4.14
Sarid, S.	5	0.5
Schnell, S. (pat.)	18	6.33
Scott, Anthony	29	9.6
Shenderyuk, V. I.	4	0.38
Shewan, J. M.	22	7.85
Shif, I. G.	18	6.14
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Shumarova, O. N.	4	0.38
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Spinelli, John	21	6.50
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	3	0.38
Thomas, F. B.	21	8.0
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	17	6.138
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